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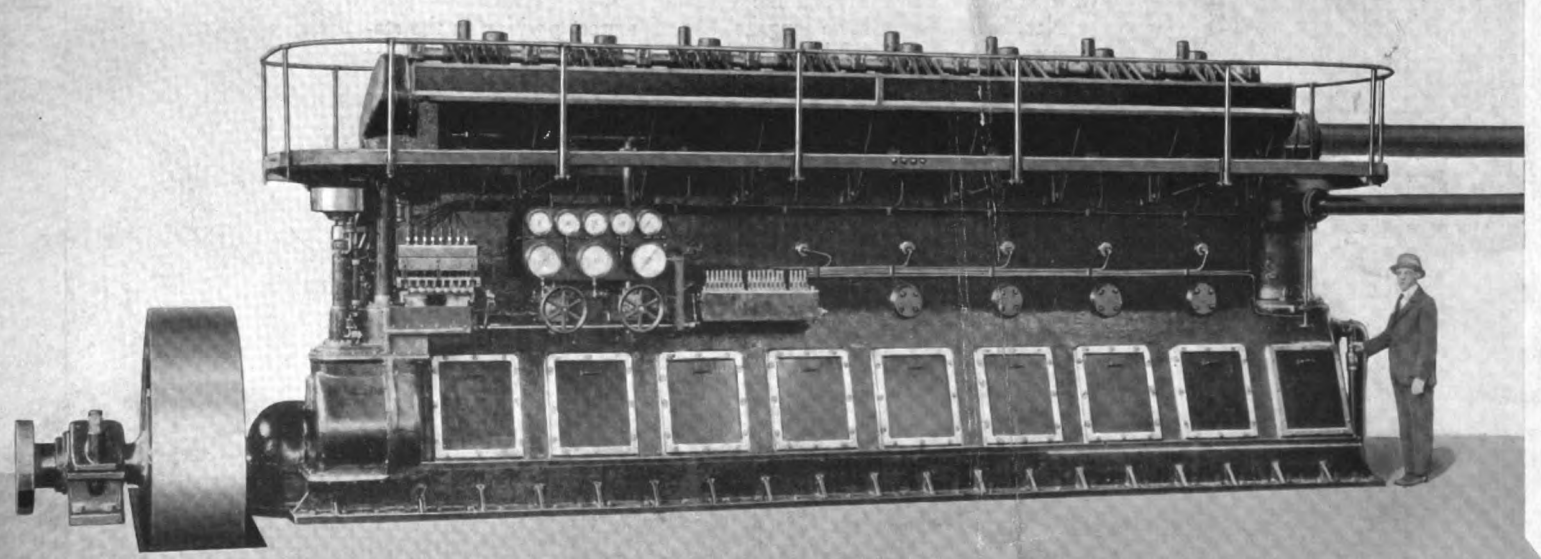
Twelve like this have been purchased by the United States Shipping Board

GROUPS of four of these 1280-b. hp. engines each driving an 800-kw. generator will form the new power plants of the former geared-turbine-driven freighters "Defiance", "Triumph" and "Courageous."

Following satisfactory performance of 12972 hp. of McIntosh & Seymour Engines on the first conversion program, five of eleven conversions on the second were allotted to McIntosh & Seymour Corporation. The 23160 hp. on the latter five is the greatest total given to any one engine builder.

McINTOSH & SEYMOUR CORPORATION, AUBURN, N. Y.



McINTOSH & SEYMOUR DIESEL ENGINES

AUG., 1928 PRICE 35c.

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Volume XIII — *August, 1928* — *Number 8*

Reconstructed Atlantic Passenger Liners Must Be Leaders in Their Class

Made Into New Diesel-Driven Vessels, With Features in Advance of Present Transatlantic Styles, the Mt. Vernon and Monticello Will Excel the Liners with Which They Will Be in Competition, and Will Hold Public Favor for 20 Years

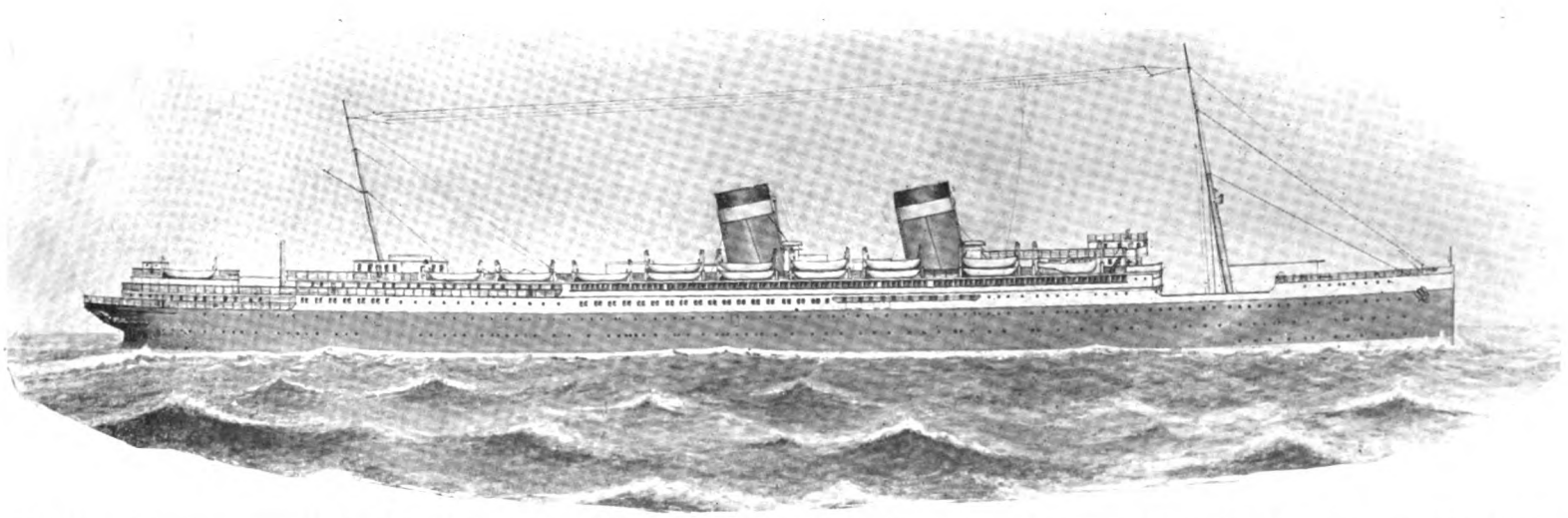
By R. W. Crowly

CONGRESS has appropriated $12,000,000 for the restoration of the big liners Mount Vernon and Monticello, to passenger service on the Atlantic. Opposition has arisen, declaring that the outlay would be excessive and that these vessels can be put into service at a cost of less than one-half, and maybe one third, that sum. What does it all mean? Who is right and who is wrong? Which is the best course for the Shipping Board to follow?

The matter is one of national interest. It should transcend politics. It should be above business rivalry. It should be determined solely on merit. These vessels are the property of the nation. Their ownership is vested in you and 120 million others living under this flag. It is your money and the money of that other 120 million of us which is to be spent on these vessels. What do you want done to these vessels to fit them for the role of helping to preserve for us a measure of independence in our ocean transportation? First and last, this is a problem affecting the American flag on the North Atlantic. Do not be deceived by any statement to the contrary. The issue is too vitally important.

To arrive at a conclusion carrying any weight or conviction one must understand the problem clearly and fully. Let us examine it from the ground up, starting with the reason for our ownership of these vessels and the purpose of our continued possession of them, then considering their present worth and finally reviewing their potential value after reconstruction.

Distressing experience taught us in the period immediately supervening upon the outbreak of war in Europe that it is a menace to our national welfare to entrust our ocean transportation entirely to foreign operators, for they are in no way obligated—nor ever can be—to give us uninterrupted service. A national conviction grew that an American merchant marine is indispensable to the safeguarding of our industry, agriculture and well-being through all the crises of distant wars and of economic convulsions that can curtail



The Mount Vernon, converted to Diesel power according to the Gibbs plan, will be finer than any of the new European passenger-liners

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the shipping service which foreign companies so glibly sell to us in normal times. To foster and encourage a merchant marine under our own flag, Congress set up the Shipping Board in 1916.

Our need soon was shown to be greater than we had perceived. Ourselves involved in war we learned that we lacked entirely all those fast vessels which could be armed as auxiliary cruisers to guard lines of communication, and that we had no big, speedy liners for the transportation of troops, other than the enemy vessels we were fortunately able to seize as prizes of war and to which we have since taken Quaker title by obligating ourselves to pay for them. Forced by necessity, we built all manner of emergency vessels to cope with our pressing needs, and these with the seized enemy ships were thrust upon the Shipping Board in 1920 with the enjoinder that they were to be used for the upbuilding of a merchant marine adequate to the transportation of at least 50 per cent of our foreign trade.

Results Accomplished With Junk Ships

Recall to mind again now, and never forget, how sorely we were distressed by the economic strangulation due to our ship poverty and also how endangered we were by want of naval auxiliaries. Let that thought be your beacon, as it is the beacon of the Shipping Board in all its efforts to promote the spirit of the mandate which Congress gave it in 1920 as the will of the nation. No aggregation of shipping intellect in the whole world could accomplish all that Congress and the nation—in their ignorance—hoped for, with the large proportion of economic junk they dispensed. Yet, with the good elements there were in that fleet, the Shipping Board has set up in business nearly all the American lines now engaged in foreign transportation, has promoted many other lines with similar intent—some of which are almost strongly enough established to live under private operation—and has kept alive the spirit of national welfare that is the whole inspiration for the American merchant marine.

Most zealously guarded of these Shipping Board lines is the sole surviving transatlantic passenger service under the American flag, known under the title United States Lines. The mainstay of this service is the former German liner VATERLAND, entirely gutted and rebuilt over here at a cost of about $8,000,000 and rechristened the LEVIATHAN. In size she has only one peer and in speed only one superior, but for comfort and service she is unexcelled and has been the vital influence in building up the goodwill of the U. S. Lines. Competing in the de luxe express class with all the finest and fastest boats on the Atlantic, she is the most popular of them all, having year by year since her restoration been at the head of the passenger carrying list with the greatest number of passengers carried during the year. But she runs alone!

Badly Needed for the U. S. Lines

Fitted into the gaps in the LEVIATHAN'S schedule are three cabin vessels, GEORGE WASHINGTON, AMERICA and REPUBLIC, the former of about 16 knots speed and the third of about 15 knots. Not only are they out of the de luxe express class, but they are certainly not in the front rank of their own class. Way below them in size are the two smallest boats of the United States Lines, the PRESIDENT ROOSEVELT and PRESIDENT HARDING of 17 knots speed.

This line-up is no match for any one of the big foreign fleets and will never put us in the front ranks on the Atlantic. A schoolboy could tell you that. From the start of the business the Shipping Board sought to improve the fleet. It besought Congress for an appropriation wherewith to build two consorts for the LEVIATHAN, to the end that the U. S. Lines with a schedule of one de luxe express steamer sailing every seven days should operate the finest service on the North Atlantic. Congress and the President refused.

Defeated on its first line plans the Shipping Board developed plans for strengthening its second line. It ordered designs for two vessels of GEORGE WASHINGTON size, about 30,000 tons displacement but of 21 knots speed, for the purpose of providing the best transatlantic service of ordinary first class boats, since it had been denied the de luxe express schedule. Those two vessels were to have been the first Diesel-liners on the North Atlantic and would have antedated all the foreign motorliners, for they were planned in 1923. Again Congress refused the appropriation.

Every year the Shipping Board has renewed its pleas, gradually making them humbler and humbler, until the last Congress voted to permit the thorough and complete rebuilding of two ex-German liners that are unfit for service in their present condition. This reconstruction of the MOUNT VERNON and MONTICELLO is the dole that has finally been handed out in response to seven years' pleading by the Shipping Board for a worthy addition to the U. S. Lines.

Let us make the best of it, and it can be really good if we do the proper thing. Congress has provided sufficient money to enable these two vessels to be gutted, re-engined and rebuilt in as able and successful a manner as the LEVIATHAN was. They are of about 26,000 tons displacement and in their early days were the blue-ribbon vessels of the Atlantic, making passages at about 23½ knots spurring the British to build the MAURETANIA AND LUSITANIA. Their passenger space can be increased 30 per cent, on a plan superior to any the transatlantic business has yet known and which no other line has yet contemplated for cabin boats. There can be a bath for every stateroom, which not one of the newest and most luxurious of the transatlantic liners can boast even in first class. That is an advantage any American can appreciate. There can be a swimming pool, exercise and sports deck and all the features which the latest vessels have introduced for attracting patronage. The d.w. capacity can be made 30 per cent greater. Diesel engines can be installed for propulsion. In every way the MOUNT VERNON and MONTICELLO can be made superior to any vessels of their size in the transatlantic business, and that indeed is the purpose of the congressional appropriation.

Let Your Business Judgment Decide

Which would you have? A couple of superlative cabin vessels superior to all competition in their class and a credit to the American flag, or a couple or re-engined old boats with patched-up passenger accommodation, A. D. 1910, repainted 1928? That is just the difference between the use of the $12,000,000 authorized for their rebuilding or a skimping of, say, $4,000,000 which the opposition is proposing.

What are these boats? Have their hulls been surveyed? Will they be good for 15 years' service? Are they worth rebuilding? Can they in truth be reconstructed to excel their competitors? Those are prudent questions to be answered by the statement that the MARETANIA, 21 years old, beat the Atlantic record last month.

The boats were built in Germany more than 20 years ago, and when new were rated among the biggest, fastest and most popular of the transatlantic fleet. They were not even second raters when they were chased off the ocean in 1914. After three years of enforced idleness, they were taken over in the name of the U. S. Government and engaged until after the armistice in military transportation and then were laid up.

When the possibility of salvaging the hulls as the shells for new vessels was first mooted, the Shipping Board engaged Gibbs Bros., the naval architects, to examine and report. The Navy Department has made a similar inspection. In drydock the hulls were meticulously inspected by the surveyors of the American Bureau of Shipping, and by Gibbs Bros., plates drilled, etc., to show the condition.

This examination revealed that far less corrosion had taken place than is normally found in steel ships of equal age, the plating and riveting having proved unusually resistive to salt water action. Gibbs Bros, had already noted in the LEVIATHAN, when they examined her prior to drawing up the plans and specifications for her rebuilding, an uncommonly small amount of corrosion. The steel available to the German builders—at least when the MOUNT VERNON and

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MONTICELLO were built and to a lesser but noticeable extent when the LEVIATHAN was constructed — was considerably superior to our present day steel in preserving itself from salt-water action.

Both Gibbs Bros. and the American Bureau of Shipping reported the hulls of the MOUNT VERNON and MONTICELLO to be sound and fit for *more than* another 10 years' service. The reports were positive and unequivocal. It is understood that the Navy Department's report to President Coolidge confirmed these findings. Without them, one could doubt the wisdom of utilizing these hulls for the virtual construction of new vessels. With them, there can be no quibbling about the desirability of economizing by the use of the hulls to save the cost of new shells.

Their machinery too is in good condition, but it is not efficient according to our modern standards, and the vessels, still being coal burners, are in that respect antiquated, wasteful, dirty and unattractive to passengers. The coal bunkers take up a big space that can be more profitably utilized—the Mount Vernon used to carry 3,000 tons of coal for her passage. Coal bunkering makes a vessel so messy and is such a cause of delay that the transatlantic liners have all abandoned it and must adhere to oil burning no matter what the price of oil may be. Nobody suggests that the original machinery of the MOUNT VERNON and MONTICELLO should be retained. All agree that it should be replaced.

From there onward is disagreement. The shipyards favor geared turbines because they can bid on that machinery complete; there is a turbo-electric interest promoting its own system; watertube boiler makers are in favor of high pressure turbines because thereby they assuredly eliminate Scotch boilers, which still have many adherents. and together all these steam interests are united in fighting the Diesel engine builders who contend that the MOUNT VERNON and MONTICELLO must be motorliners if they are to rate as up-to-date vessels during their next period of usefulness. Gibbs Bros. have prepared for the Shipping Board several alternate proposals covering the various systems.

Why Diesel Power Is Desirable

Which of all these is most desirable? Which will be the most economical and most efficient? Which will be the most popular with the traveling public? Which presents the greatest sum of advantages? There is room for honest differences of opinion on some of those questions, but most of the opinions that are aired are partisan. In this magazine, devoted as it is to the cause of the motorship, the statement might be expected that Diesel propulsion would lead in efficiency and economy. As far as that goes, i.e., in engine efficiency and fuel economy, it may be a partisan expression of opinion, but it is also incontestably true. Other factors, however, have to be taken into account to determine the overall efficiency, economy and desirability of the vessels with the alternate systems of propulsion. I am not going to argue here that the Diesel installations would be superior to the steam installations, because the argument would not get us anywhere. The steam people would not admit my figures. I can challenge theirs. It really does not matter, because a far more important issue is involved.

The MOUNT VERNON and the MONTICELLO ought to be, and must be, motorliners because it is of great national import that experience shall be had here in the construction and operation of powerful Diesel engines. This experience is needed for the Navy Department; it is wanted for the merchant marine. Other countries are getting that experience through the courage, foresight and wisdom of their shrewd, alert shipowners, each watching the other, each seeking an advantage, first one and then another stepping a little ahead and all together in that manner contributing to great advances. We, who are still groping for ways and means to make ship operation profitable under the American flag have no such way to progress.

Remember that the Navies of other countries profit by the experiences of their merchant shipowners. Shall we be the only exception? Would you have the Shipping Board ignore the great benefit it is in a position to confer on the U. S. Navy by providing some of that valuable experience with big Diesel engines which other countries are getting.

This is a crucial opportunity. If the MOUNT VERNON and MONTICELLO are not made to serve such a national need, if they are not engined with Diesel machinery but with steam, our Navy will be deprived of valuable high-powered Diesel experience for a long time to come, and who shall say with what direful results? The time is approaching when the Washington Naval Treaty will expire and when new battleships will be constructed even if the treaty limitations are renewed for a further period of years. Plain prudence dictates that we should not be found asleep at the switch, ignorant of the powerful modern oil engines which at that date may be chosen for many tactical reasons as the modern warship's machinery. Against that day let the Navy Department have the practical knowledge that will be gained by intimate contact with Diesel engines of 29,000 hp. in the MOUNT VERNON and MONTICELLO. Preparedness and economy demand it.

Relative First Cost of Secondary Importance

If you grant this — and it is the supreme factor in the consideration — you will understand why the comparisons of relative cost and economy are not worth arguing. They would divert attention from the big issue; they would be a smokescreen for the maneuvers of the opposition. Gibbs Bros. make the judicious statement that, with due reserve and allowance for the range of variability to be foreseen in the operating conditions of the vessels, no definite conclusion can be drawn that any one of the three alternate machinery systems is superior to the other two. This still leaves the undoubted advantage with the Diesel engine that it makes motorliners of these vessels, so that they will not only be as up-to-date in that respect as the Swedish, Italian and proposed British liners of this kind, but they will also escape eclipse from obsolescence.

There are thus three grounds of national interest underlying the need for the complete rebuilding of the MOUNT VERNON and MONTICELLO and their conversion into motorliners. One is the economic necessity of strengthening the competitive power of the U. S. Lines. The second is the want of vessels that can be converted into auxiliary cruisers in time of national peril. The third is the prime requirement of big Diesel engine experience for the benefit of the Navy Department, with the corollary building experience in one of the Diesel engineering works in this country. It is much the fashion in business circles to smile at, and not infrequently to scoff at, national interest. In those quarters the summary of our argument will produce no impression, but there is a business argument they cannot laugh off.

Will Excel All Liners Now On the Atlantic

The MOUNT VERNON and the MONTICELLO are to be the topnotchers of the cabin fleet in the North Atlantic, peerless and unexcelled. They will give cabin passengers what they have never had before, namely, an Atlantic passage at first class speed and with accommodations in some respects superior to first class. None of the other lines can match that standard until their express steamers become too shabby and demodes for first class traffic and are relegated to the cabin trade. Today the biggest cabin vessels are the GEORGE WASHINGTON, ADRIATIC and BALTIC, followed by the CEDRIC, CELTIC, CARMANIA, CARONIA, etc. They are all erstwhile first class boats with 20 years or more of service behind them. They make 16 knots and 17 knots—perhaps. The MOUNT VERNON and MONTICELLO—Diesel driven—will make 21 knots and have a sea speed of 20.

On the biggest and best cabin boats of today the passengers have the first class accommodations of 20 years ago. The MOUNT VERNON and MONTICELLO will have ultra-modern first class accommodations; airy, well ventilated public rooms; sheltered promenade decks; a play deck; a swimming pool—which not even all the de luxe steamers possess—

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and a bath for every stateroom, which only a single one of all the de luxe steamers even approaches. Is it to be doubted that these two new vessels for the U. S. Lines will be the most popular of all cabin boats, and is it not a sound and fair assumption that during the lean months of the winter they will be filled at the expense of competing lines?

With these accommodations and with their speed will they not take patronage away from many of the first class steamers, for what will these latter have to offer in compensation for the higher fare? The fact is that the new MOUNT VERNON and MONTICELLO will cleave a new division line in the North Atlantic passenger fleet. They will themselves be surpassed only by the de luxe express steamers, and the ordinary first class boats will begin to go into the discard. You must realize that vessels like the HOMERIC and BELGENLAND are slower and that other great favorites like the OLYMPIC and the PARIS can get passengers to London no faster. Cabin passengers will for the first time be offered first class speed.

Due to the economy that comes from the use of sound German hulls for these two new liners—for in all respects except the hulls they will be new vessels—the cost of construction will be lower than the European price would be. This is our last and only chance of getting two new transatlantic liners with such economy. The foreign lines understand it and are alert to the threatened depreciation in their investments. Perhaps they are not entirely innocent of a part in the opposition, and one must avow they would be stupid not to add their two cents' worth to it when they can.

The U. S. Lines will have two excellent money-earners in these boats and will gain a vast amount of good will through them. Getting out of the red has been a long and arduous task for the U. S. Lines, an uphill fight with the LEVIATHAN as their only good drawing card, with no established goodwill nor age-old connections and with public opinion sick from political poison. Against them were arrayed all the power and influence and travelers' favor of the biggest and strongest shipping companies in the world, with the finest ships afloat, years of popular tradition behind them and their books bright with war profits. The Shipping Board in 1927 showed a profit on this operation, public sentiment is veering towards it, greater numbers believe we can hold our place on the North Atlantic and less anxiety will be felt about the transfer of the line to private ownership.

We must not rest. The U. S. Lines need strengthening, whether under Government ownership or in private hands. The MOUNT VERNON and MONTICELLO will be the headliners of the entire transatlantic cabin fleet and will be very profitable boats. They will make good auxiliary cruisers if so be that war comes within their period of life. And the construction and operation of their powerful Diesel engines will secure for us just that experience and production which our Navy and our merchant marine so essentially need right now. Let's Dieselize these liners, at once.

World's Biggest Tanker Diesel Powered

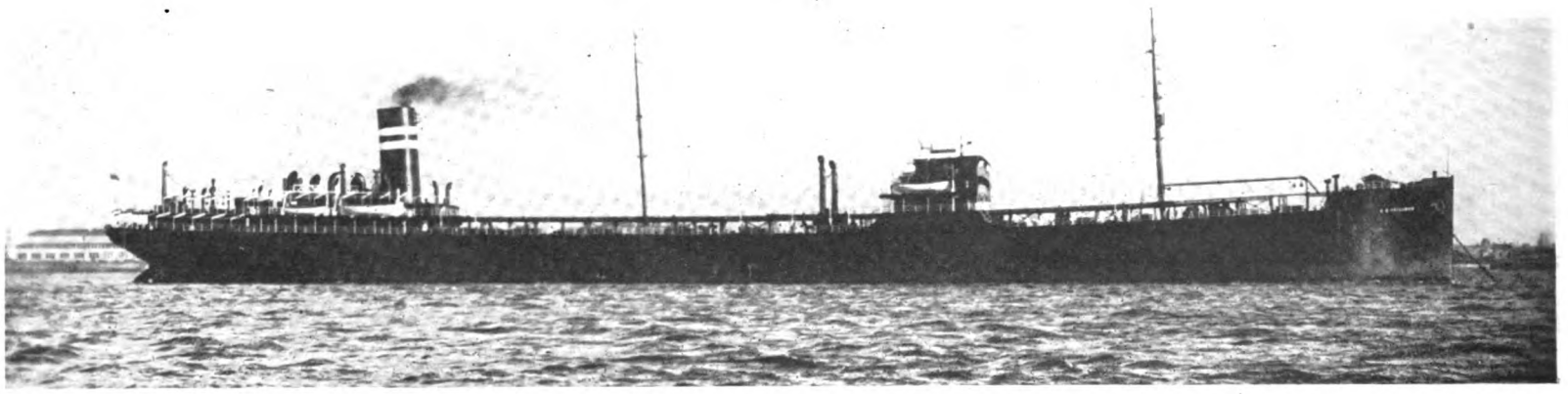
Carries 23,600 Tons Net-Cargo at Over 11 Knots on 18 Tons of Fuel per 24 Hours

THE larger and higher powered the ship, the greater is the economy of Diesel power compared with steam. A typical case can be found in the performance of the new tanker C. O. STILLMAN recently completed and now operated by the International Petroleum Company, Ltd. She was built at the Bremer-Vulkan Yard at Vegesack, Germany. This vessel can carry 23,600 tons of bulk cargo —without taking into consideration fuel, water, stores, etc.—at over 11 knots on 18 tons of fuel per 24 hr. day. On a basis of 265 nautical miles per day covered by the ship, and on a basis of $1.05 (San Pedro) per bbl. (6½ bbls. per ton) for Diesel fuel of mixed character, this means a cost of $0.0000198 per ton-mile of net cargo carried. This is an extremely low carrying cost, and probably works out less than any other ship in the world. Our comparison, of course, is purely on a fuel basis, and does not include any operating or overhead charges.

The C. O. STILLMAN is propelled by two M. A. N. six-cylinder, single-acting, two-cycle type Diesel engines constructed under license at the Bremer-Vulkan Yard. They are together capable of developing 4500 s.hp. at 90 r.p.m. These engines, although of M. A. N. design in general, contain many improvements, which have been embodied in their construction as the results of Standard Oil experience in the operation of a large number of Diesel tankers. The cylinder diameter of these particular engines is 27½" x 47½ stroke. The general dimensions of the vessel follows:

Loaded displacement	32,500 tons
Net bulk-oil cargo capacity, 165,000 bbls.	(23,600) tons)
Dead weight capacity	22,750 tons
Length	565 ft. 0 in.
Breadth	75 ft. 4 in.
Depth	44 ft. 6 in.
Draft	32 ft. 6½ in.
Speed (Average Loaded)	11 knots
Daily fuel consumption (loaded), 130.3 bbls.	(18 tons)
Daily lubricating oil consumption	79.3 gals.
Designed power	4500 s.hp.
Power on first loaded voyage (main and auxiliary engines)	5715 i.hp.
Power on maiden voyage (main and auxiliary engines)	4504 i.hp.

Although the C. O. STILLMAN is the largest tanker on the high seas—Diesel or steam driven—she was completed in the



This new Diesel ship carries 23,600 *tons net-cargo at* 11 *knots on* 18 *tons of* $1.05 *per bbl. fuel per* 24 *hours, or* $0.0000198 *per ton mile. She is the C. O. Stillman—a Standard Oil tanker*

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remarkably short time of 16 months after the signing of the contract and was delivered February 2nd last.

Three Diesel-driven generator compressor sets, two Babcock & Wilcox type water-tube boilers, a vertical heating boiler, and two exhaust-gas boilers are installed. All auxiliary units including winches, windlass, steering gear, etc., are electrically operated and all essential units are in duplicate. In addition emergency steam driven units are installed. There are three horizontal duplex compound steam cargo pumps built by the Atlas-Werke, Bremen, that have a combined discharging capacity of 9000 bbls. per hour.

Though this tanker has not been sufficiently long in operation to judge accurately as to performance, and has not yet been run at full speed, it is worthy of note that on first trip from the yard at Bremen to San Pedro, California, the vessel averaged 11.08 knots with the motors running at only 84.9 r.p.m.; m.i.p. 71.3 lbs. per sq. in. total i.hp. of main and auxiliary motors, 5404, fuel consumption per day 125½ bbls., mean draft 19 ft. 1½ in.

On the voyage from Talara to New York loaded the C. O. STILLMAN averaged 11.06 knots at but 84.7 r.p.m., m.i.p. 75.9 lbs. per sq. in., total i.hp. main and auxiliary motors 5715, fuel consumption per day 130.3 bbls., engine oil per day 29.3 gallons, cylinder oil per day 6.8 gallons, mean draft 32 ft. 3¾ in. These figures have been checked by the owner of this ship.

America's Largest Single Engine Diesel Ferry

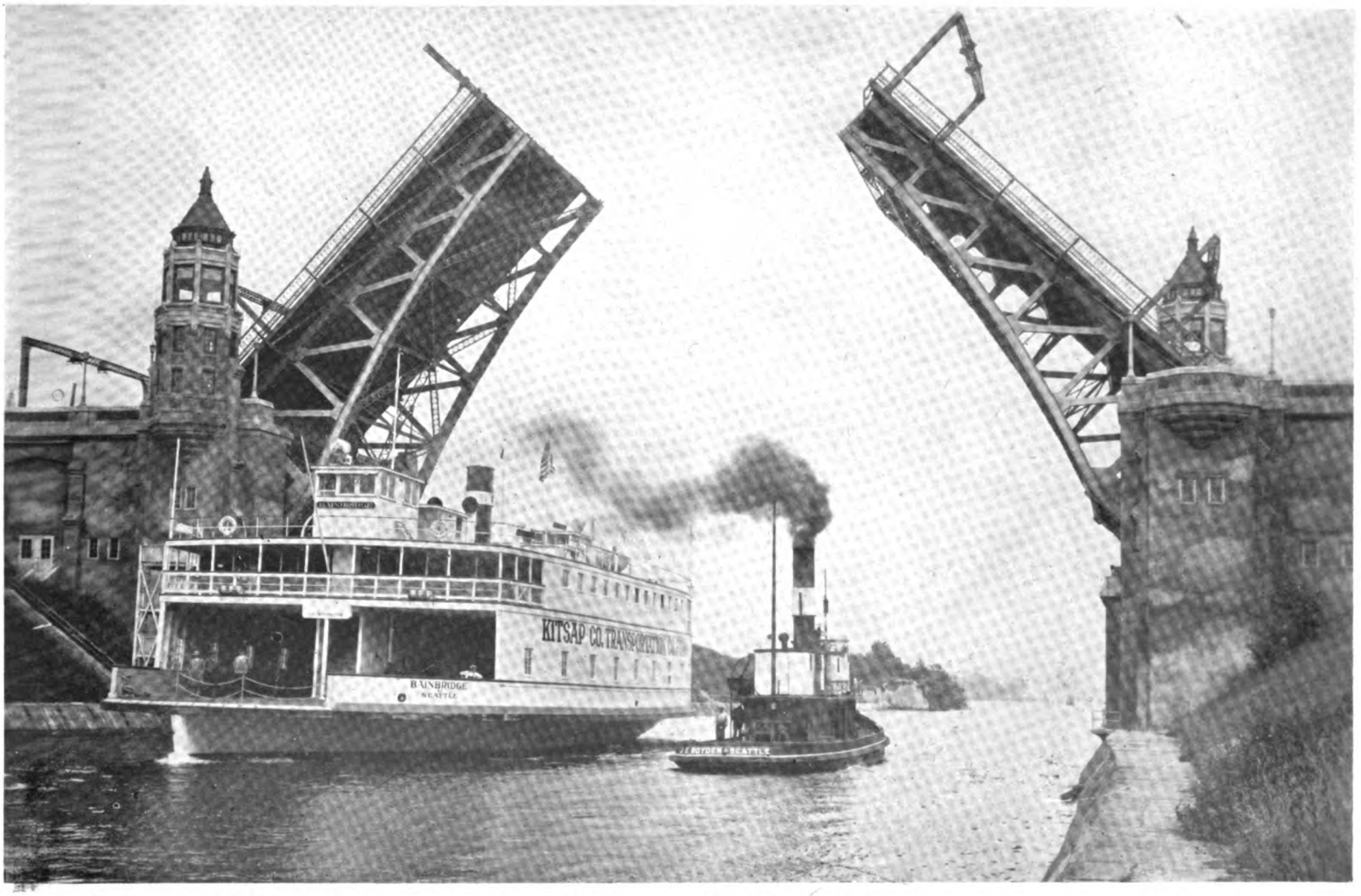
Owner's Previous Experience in Pacific Coast Diesel-Driven Ferry Operation Prompts Choice of Clutch Drive with Right and Left Hand Propellers

TO meet adequately a rapid increase in across-the-Sound automobile traffic, the Kitsap County Transportation Co. recently placed the new Diesel ferry BAINBRIDGE in service between Seattle and Port Blakely. This company's fleet now consists of six automobile carriers, giving ferry service from Seattle to Vashon Island, Bainbridge Island and the mainland on the Olympic Peninsula side of the Sound. The extent of traffic increase across Puget Sound is indicated by figures for the two years prior to 1928. Last year 102,274 cars were transported by this company, as compared to 81,389 cars in 1926.

In 1925, the double-ended type Diesel ferry KITSAP was placed in service. She was, at that time, the largest ferry north of San Francisco. She has a capacity of 75 automobiles and 800 passengers. The BAINBRIDGE is also a double-ended type, but of larger dimensions. She is designed to carry 90 automobiles and 1000 passengers, and is said to be the largest single engined Diesel ferryboat built in America, if not the largest of her type in the world. Her length is 187 ft. 8 in., moulded beam 57 ft. 8 in., and moulded depth 16 ft. Construction is of Douglass fir throughout. Completed, the BAINBRIDGE is almost a 100 percent Puget Sound product.

The main engine is a double-ended, double-clutch type Washington-Estep marine Diesel of 800 s.hp. of the four-cycle, airless injection typ built in Seattle. It has eight cylinders in line, each with a bore of 17″ and stroke of 24″. The rated speed is 190 to 200 r.p.m. This type of drive with clutch at each end of the engine has been thoroughly tried out by the Kitsap County Transportation Company in their ferryboat, the KITSAP, powered with a 600 hp. engine of the same make, and which has been giving perfect service for the last three years.

The double clutch drive is considered by the owners to give the most efficient results



Diesel ferry Bainbridge passing through the Lake Washington Ship Canal at Seattle. In service she makes a 14-mile round trip

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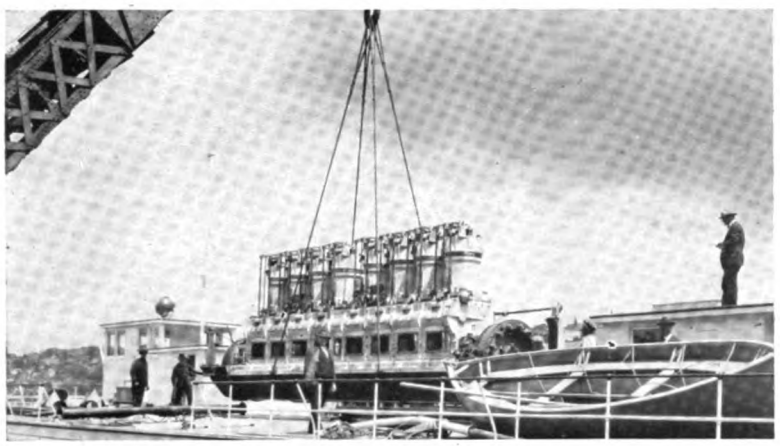
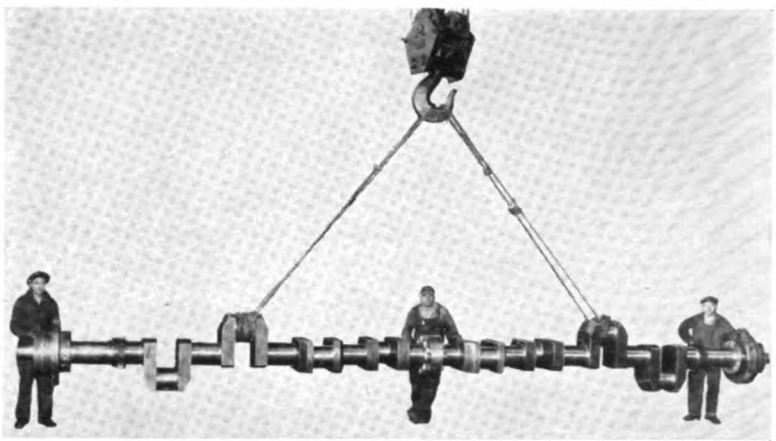


The Washington-Estep, 800 *s.hp. Diesel was lowered to place with a single lift*



Two-piece Isaacson crankshaft forged for the main engine of the Bainbridge

in double-ended ferry boat service. This is due to the fact that not more than 5 to 6 per cent is lost in mechanical efficiency, resulting from the idle forward propeller, whereas it has been demonstrated that from 17 to 20 per cent of the power is lost in a solid hook-up with positive drive to the propellers on both ends. The greater loss of power in the latter arrangement results from the force of water, in the wake of the forward propeller, reaching the hull. On this basis the double clutch arrangement results in a gain from 12 to 14 per cent in all over efficiency, as compared to the solid hook-up.

Another point of advantage claimed for the clutch system is its extreme simplicity. A simple non-reversing engine with two one-way non-reversing clutches, coupled with left and right end propellers, is all that is required. By this arrangement it is possible to obtain instant action and perfect control of the ship, as well as better steering control when making a landing.

A special feature of this installation is the extreme flexibility of control. The engine can slow down to as low as 40 to 50 revolutions per minute. This flexibility is said to be obtained through the excellent atomization, resulting from the airless, or mechanical fuel injection system employed. The refrigerating effect of expanding the air, which occurs in air injection type Diesel engines is eliminated. The airless system employed on this engine is said by the designers also to permit much simpler machine work, besides resulting in a gain of at least 10 per cent in mechanical efficiency, compared with air injection if applied to the same engine design. The engine is hooked up to two 4-bladed 99 in. diameter x 78 in. pitch Coolidge-designed propellers, one at each end of the vessel. One of the propellers is right hand and the other left hand.

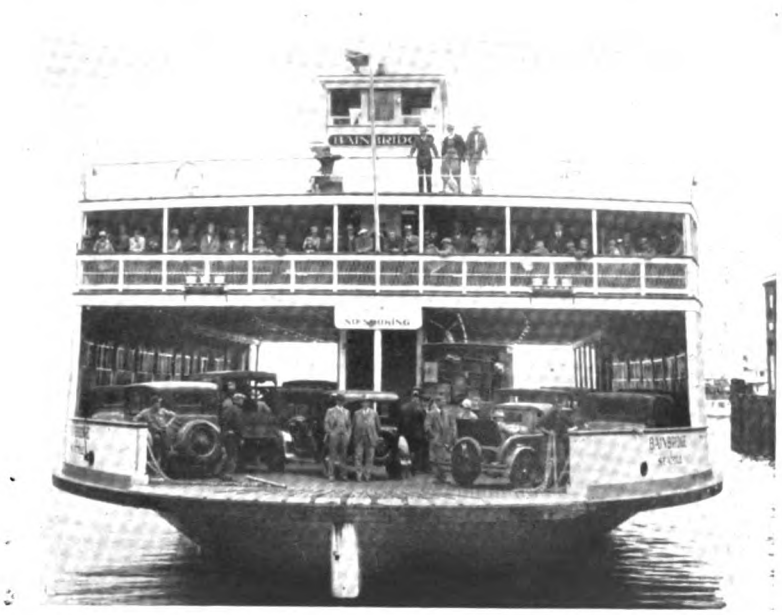
Machinery arrangement provides ample space for auxiliaries and accessories necessary to the operation of the ferry. A 2-cylinder 8½ in. x 10 in. bore and stroke, 450 r.p.m. Washington-Estep Diesel is direct connected to a 25 kw. 115-V. compound wound D. C. Westinghouse generator. These are mounted on a common sub-base and constitute a complete self-contained unit, furnishing all electricity used aboard of the vessel for lighting, cooking, and driving the various electric motors hooked up to other auxiliaries.

The engine in design is very similar to the 800 hp. main propelling unit, special features of which will be described later in this article.

The auxiliary generating set just described is located in one end of the engine room, just opposite the main control of the main engine and within convenient reach of the operating engineer. A stand-by unit for furnishing compressed air consists of a small compressor belt driven by a small electric motor of suitable size. In addition to the 25 kw. generator, there is a 5 kw. 115-V. generator mounted on heavy brackets attached to the main engine, and driven off the engine fly wheel with a belt and idler pulley.

A Moran centrifugal pump is employed for bilge service. It has 2½″ discharge and 3″ suction pipes, and the rated capacity is 350 g.p.m. at 20 ft. head. It is direct connected to a 5 hp. Westinghouse motor which operates at a speed of 1450 r.p.m. The motor and pump are mounted on a common sub-base. The fire pump is of the same make, and is of the two-stage centrifugal type with 3 in. discharge and 4 in. suction. It is brass fitted throughout and driven by a 25 hp. motor which turns at a speed of 1750 r.p.m. The capacity is 200 g.p.m. at a pressure of about 100 lbs. per sq. in. This pump and motor are also mounted on a common sub-base. Both pumps are located in the opposite side of the engine room and in the opposite end to the main generator.

On the same side of the engine room as the main generator are located two other pumps. One—a Delco Light fresh water pump supplies fresh water throughout the boat, and the other is a sanitary pump. The sanitary unit is a motor driven gear type pump with a capacity of 600 gals. per minute. It is under automatic control, and is piped to a suitable sanitary tank of about 300 gals. capacity, located on the hurricane deck. A variation of pressure



Autos in sight indicate the carrying capacity of the Bainbridge

The quick lunch counter invites commuters to breakfast while riding

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between 10 and 20 lbs. on the sanitary line starts and stops the pump. The fresh water pump is piped to fresh water tanks located in the hold and distributes water to a number of outlets on the deck which include drinking fountains.

Edison storage batteries consisting of 90 cells of the B6H type are employed for emergency lighting. They are of 112½ amp. hrs. total capacity and are wired for charging off the generator mounted on the main engine, and are automatically cut out when this generator falls off in speed.

The BAINBRIDGE is heated throughout with a low pressure steam heating system. One American Radiator Company "Ideal" sectional cast-iron boiler is employed. This boiler is attached to an automatic dual oil burner. A capacity of about 1200 square feet of radiation is provided in the boiler. The installation of this heating plant has been thoughtfully planned. There is a metal drip pan under the boiler, with an edge turned up four inches all around. The corners are welded, making the pan oil tight. Under this drip pan there is a layer of brick surmounted with a sheet of one quarter inch asbestos millboard.

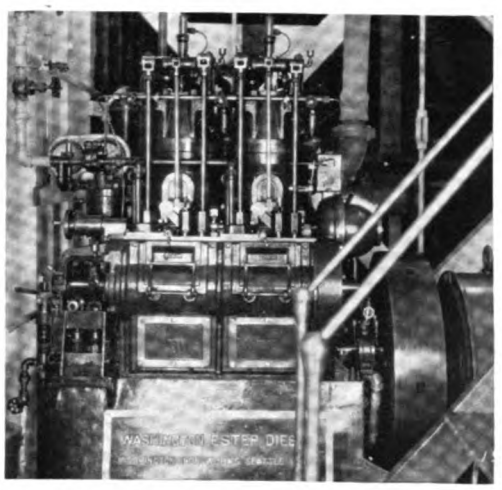
A very elaborate switchboard was manufactured and installed by the Marine Electric Company. It contains voltmeters, ammeters, special designed automatic battery charging and discharging series parallel switch. An automatic generator no-voltage release is also provided. The electric arrangement of lighting and other service throughout the boat has been very carefully designed and correctly installed.

To silence the exhaust, a special muffler designed and manufactured by the Washington Iron Works has been installed. This muffler is mounted on suitable brackets and is located in the stack. The main engine exhaust pipe is connected at the center of the engine exhaust manifold and is piped to the silencer. Metal lath and asbestos are used to insulate the exhaust piping to the main deck level.

A De Laval centrifuge is connected to operate continuously purifying the lubricating oil in use in the main engine. It has a capacity of 60 gals. per hour, thus ensuring perfect lubrication as far as oil contamination is concerned.

The main engine is worthy of attention. As previously stated, it develops 800 s.hp. at 190 to 200 r.p.m. With the highly developed fuel atomizing system, the manufacturers guarantee this engine to develop, on breaktest at normal speed, as much as 15 percent above its rated power; this while maintaining perfect combustion and a clear exhaust. The weight of the engine alone is 200,000 lbs.

The fuel system employed consists of a mechanically timed direct-fuel injection power pump forged integral of steel. It is eccentric driven and delivers to a simple type of fuel valve, one of which is located in each special shape combustion chamber. The entire arrangement gives a very excellent degree of combustion without the use of any complicated mechanical device. Very fine mesh strainers are provided in each fuel valve to prevent clogging of the spray nozzles. Special relief pressure-regulating valves are provided with removable reversible hardened steel seats and stems, which are said to give the maximum amount of relief service without causing trouble.



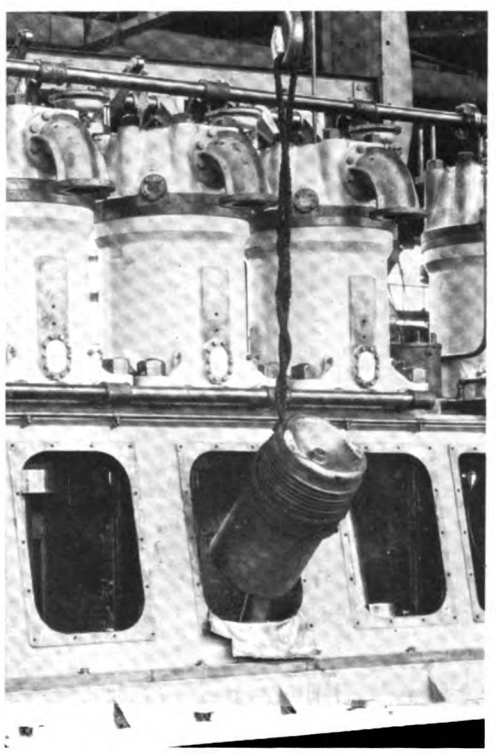
The 25-kw. 425 r.p.m. Diesel generator engine

Fuel is under control of the governor at all speeds of the engine.

The cast-iron engine base is of the enclosed crank-pit type, heavily ribbed and reinforced wherever necessary. An extension at each end of the base carries the fly wheel, clutch and thrust bearing assembly. The engine frame, mounted on this base, is of heavy construction of the open sided type. Removable columns are provided on the working side. The entire frame is enclosed with large quick removable plates, in which are fitted inspection doors.

The crankshaft is 10½" in diameter and is accurately machined, to form interchangeable halves, from an open hearth steel forging, and meets the requirements of Lloyd's specifications of similar work. The removable columns just mentioned make it possible to take the crankshaft out of the side of the engine without dismantling the cylinders or any of the other major parts. It was forged by Isaacson.

Connecting rods of the T type, machined all over, are of 0.35 carbon open hearth forgings. Like the crankshaft, they are drilled for pressure lubrication. They are fitted with adjustable marine-type boxes at both ends. A heavy cast steel crank-box is lined with high grade nickel babbitt accurately bored and scraped to fit the crankpins. The crosshead boxes are similar to the crank-boxes except that the bearing is made of phosphor bronze. Square set marine type main bearings are made adjustable for line and running fit. They are held in place by through bolts. Nickel babbitt is also used in these.



Pistons may be removed without disturbing cylinder heads

Cylinder jackets, separate for each cylinder, are made of close-grained heat-treated cast iron. Ample water jacket space is provided, and nickel steel studs are used for attaching the cylinder heads. An example of the attention to detail is the large clean out doors, providing access to the water jackets of each of the cylinders. Heat-treated cast iron trunk type pistons are designed with concave ends. They are provided with strongly ribbed supports to hold hardened steel piston pins. Oil is prevented from entering the inside of the piston and finding its way to the hot head by an arrangement of splash guards. Of a special interest is the fact that these pistons are removable either by lifting in the conventional manner out of the top of the cylinder, or by dropping them down into the crank case and taking them out of the doors provided for this purpose.

Simplicity marks the design of the cylinder heads, in which are provided large water-jacket space, thus ensuring a cool running job. The valves are from special hard iron with nickel steel stems and fitted to interchangeable removable valve cages.

An added degree of simplicity is obtained, since in this engine it is not necessary to core an extra opening through the water jacket for the starting valve. This is made possible by a special type of starting valve which admits air through the main intake valve. By this means it is said that the added simplicity of design produces a more equal distribution of heat stresses throughout the cylinder head. It is also maintained that the extra space around the valves makes for better cylinder head cooling.

The camshaft is substantial in design and ample in proportion. It is mounted on adjustable removable bearings and fitted with hardened steel accurately machined cams. The assembly is entirely enclosed and runs in oil. It is driven with simple spur gears of large diameter and ample face. An idle gear between the driving gear on the crank shaft and driven gear on the camshaft is made of bronze. A double system of force feed lubrication is employed. It provides circulation of oil to a manifold which feeds the crank shaft bearings, from which the oil finds its way to the crossheads as well as the crank pins. A pump picks up the oil from the crank pits after it has passed through strainers, and delivers it to an auxiliary filter and cooling tank, from which an automatic pressure pump delivers it to the bearings. Mechanical oilers of the Manzel design furnish fresh oil for cylinder lubrication, which is supplied by multiple feed to each cylinder.

A single hand wheel controls both clutches by means of an interconnection between them. These clutches are designed by the engine manufacturers, and are a combination of cone and disk. They are asbestos friction lined throughout.

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Vincent Astor's New Diesel Yacht Nourmahal

Radical Departure in Design Includes Straight Stem, Cruiser Stern, and the General Appearance of Sea-Going Liner. Two 1600 s.hp. Sulzer Diesels Are Installed

EARLY in 1926 Commodore Astor commissioned Theodore E. Ferris to design for him the new yacht NOURMAHAL. This craft was to be much larger than several of the same name constructed in years past for the Astor family. By cooperating with Mr. Ferris, who has spent all of his life in creating commercial vessels, Mr. Astor, with his many years of experience in deep sea yachting, has obtained a vessel in many ways comparable to a small ocean-going liner. She is capable of ocean cruising in safety and comfort, being large and powerful. In fact, there are only a few pleasure craft in existence today that are equal to her in this respect. This is the first Diesel yacht designed by Mr. Ferris, and by results attained indications are it will not be the last.

The new NOURMAHAL represents the most radical departure in yacht design that has ever been brought about. The influence of experience with sea-going liners is plainly to be seen. An example of this departure is the adoption of a cruiser stern, which with the straight stem is said to add much to her seaworthiness and comfort of owner and guests. In order to remain within the dimensions desired, a high volume of displacement was adopted with the intention of loading heavily. Provision is made for about 1200 tons of changeable load, made up of fuel oil, fresh water, water-ballast, stores, baggage, personnel and effects. The fuel oil, fresh-water tanks and salt-water ballast tanks are arranged for independent use, with the exception of certain of the double-bottom tanks which are to be used for either fuel oil or salt-water ballast.

This arrangement has been planned as far as practicable with a view that when the vessel is used in normal short run cruises, a small amount of fuel oil and fresh water may be carried with a large amount of salt-water ballast. On long voyages, as fuel is consumed, the salt-water ballast tanks may be filled with an equal weight. So an almost constant load draught and a common metacentric height may be maintained.

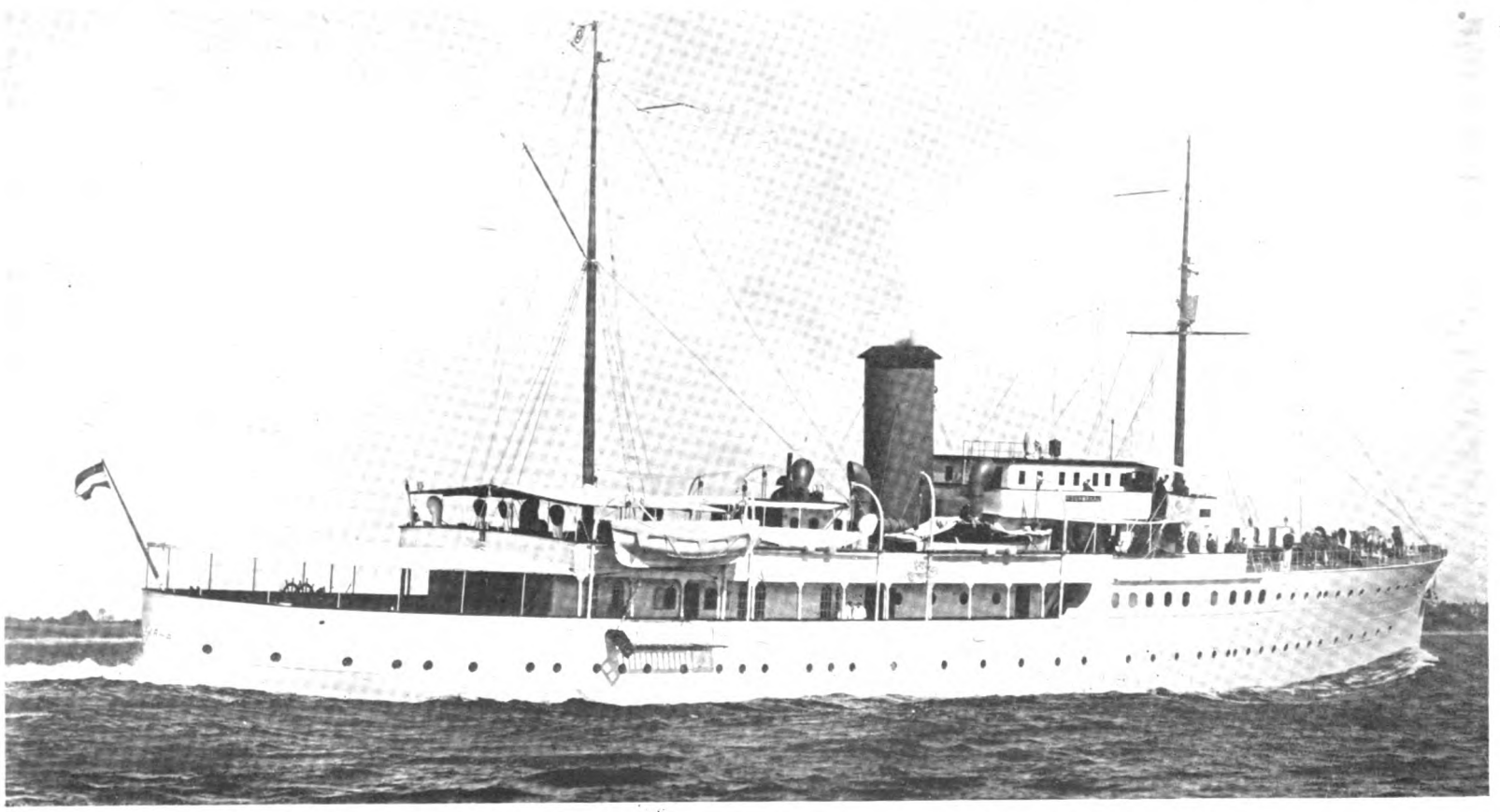
A spacious living room, a library, dining saloon, a deck shelter house and sun deck comprise the general living quarters. Luxuriously fitted staterooms are provided for the owner and guests, all with connecting bathrooms and large wardrobes. Three of these rooms are located on the main deck and six on the lower deck. Then there are adjoining rooms for valet, maids, and a pressing room. The furniture was bought in England, and installed at Southampton after the vessel left Krupps shipyard at Kiel. Internal accommodation arrangements were planned by Cox & Stevens, while the principal rooms were decorated by Charles Platt of New York.

Although the hull and main engines of the NOURMAHAL were built abroad a considerable amount of the equipment was purchased in the United States and shipped to the builders, including all plumbing fixtures, storage batteries, radio and radio compass, searchlights, course recorders, all launch engines, library panelling and the bathroom floor.

Characteristic of the spaciousness of the cabins is the living room, 25 ft. by 28 ft., located aft of the engine-room hatch in the main deck house. A real fireplace, with artistically carved wood mantel, is equipped to burn coal or wood. It is located at the forward end of this room, which is used as the main lounging space and is furnished with a number of large sofas, deep arm chairs and fine rugs over parquet flooring. Rare paintings, tables, electric phonograph, radio broadcast receiver, and richly panelled walls add beauty to a homelike atmosphere. Large bronzed framed windows swing outboard and are hung with fine draperies.

The library, at the after end of the main deck house, has walls lined with shelves, and well filled bookcases fitted with artistic glass doors. Parquet flooring and heavy rugs are also used in this room which is panelled in white pine with a special "pickle pine" finish. Deep lounging chairs, sofas and small tables comprise the furniture. The windows are bronze framed and richly draped.

A panelled dining room is located on the



Vincent Astor's new Nourmahal as she appeared upon entering her home port, New York

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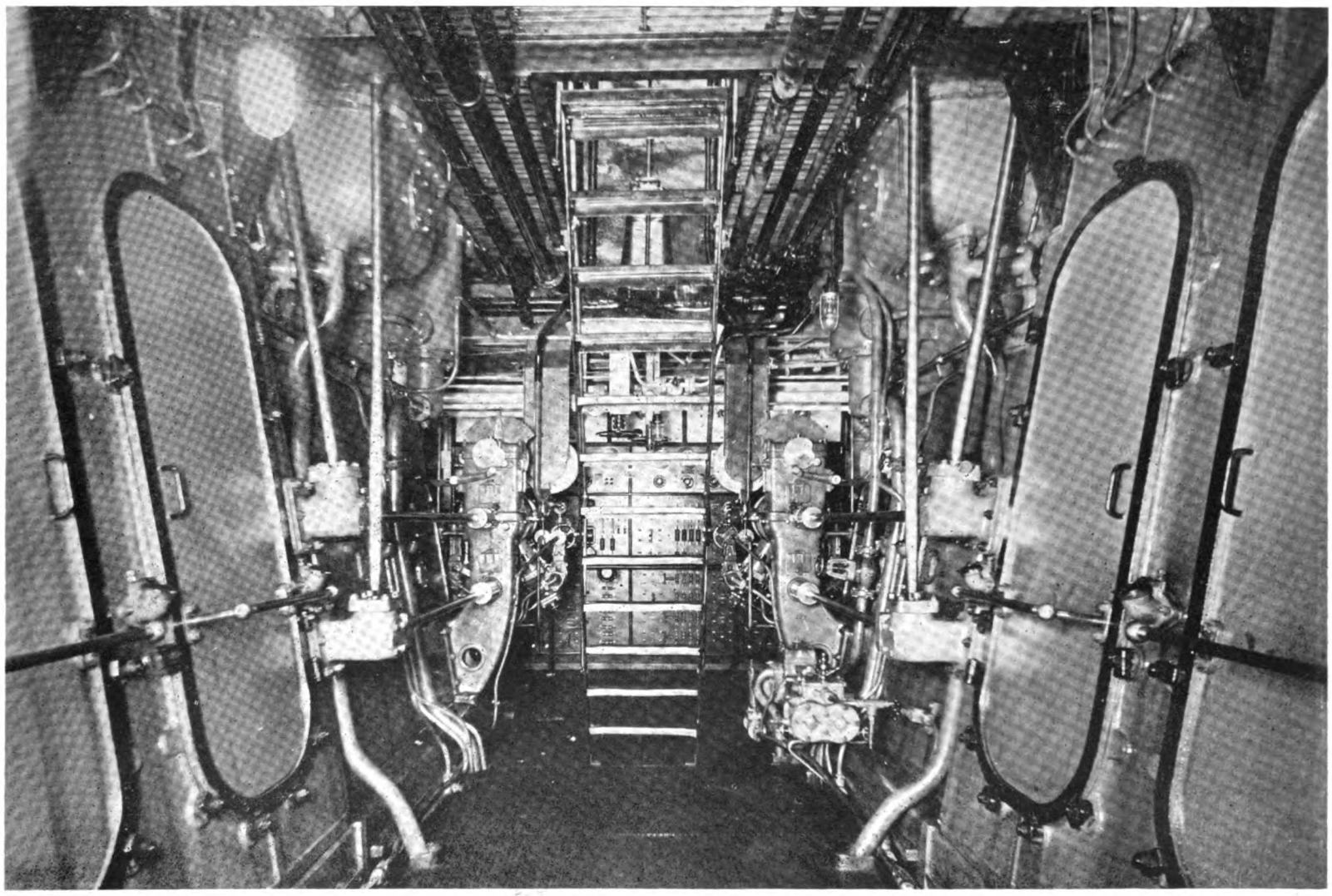
Comfort characterizes Nourmahal salon

A corner of the owner's cabin

bridge deck, and fitted with a large table, chairs, serving tables, built-in sideboard and lockers for silver. Just aft of this room is the main pantry with steam tables, toasters, refrigerators, hot water and coffee urns, and ice cream cabinet. A dumbwaiter connects the two working spaces. A coal burning range together with dressers, working tables, and ice cutter form a part of the galley equipment, although one would expect to see an electric range on such a ship. A small entrance lobby with stairway from the main deck, is finished in hard wood panel work of walnut. A special dining room for domestic staff, one for the ship's officers, and others for the crew is provided. Located between the living room and library, with a stairway from the lower deck, is the main lobby with a large sofa, tables and chairs. A fish-rod closet and coat closet are built in full height panel work.

A crew of 50 is provided for, but only 42 will be carried. The deck department has 18 men and the engine department 12. There will be from 12 to 20 in the steward's department, depending on the number of guests. The vessel was built under special survey of Lloyd's Register of Shipping covering workmanship materials and equipment. In addition construction and equipment complies with the United States Steamboat Inspection Service and the Public Health Service requirements.

Sperry automatic steering and compass is used in addition to the magnetic compass. In order that guests may watch the operation of the master gyro, it is mounted



Looking between the two Sulzer main Diesel engines of the Nourmahal. Switchboard can be seen in the background

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in a small room with plate glass windows off the passageway to the owner's quarters. From this master gyro true North indications are sent electrically to the steering repeater and bearing repeater located on the open bridge and also to a 30-day continuous course recorder, and a repeater which permits true bearings to be taken with the radio direction finder.

A gyro pilot—"Metal Mike"—or automatic steering equipment is also provided, which is a triple steerer type recently developed by the Sperry Company for yacht use. The control, or steering unit, acts as an electric telemotor system as well as an automatic steering system. The power unit of the gyro pilot is mounted in the steering engine compartment and actuates the control of the hydro-electric steering system. Emergency hand control is provided in case the electrical supply to the gyro pilot fails. A hand wheel, by means of shafting and rope control, may be made to operate directly the throttle valve of the hydro-electric steering engine. A steering wheel, by means of which her predecessors have been guided during fair weather or foul, has a war-time affection for Mr. Astor, who has had the Sperry Company build it on the control unit of the new NOURMAHAL.

Heating throughout is by means of a hot water system. Two oil-burning boilers are installed in a separate gas-tight fireproof steel enclosure in the main engine room. Centrifugal pumps are provided for circulating hot water throughout the boat. Each boiler constitutes an independent system, but they are so piped that both systems can be worked together when required. Natural ventilation is supplied by means of cowls, and there is also provided a mechanical ventilation system with ten large size electrically driven supply and exhaust fans, which provide a complete change of air every three minutes in the quarters.

A refrigerating-machine room is completely enclosed in steel and made gas-tight because of the use of a direct expansion ammonia system. Two 2½ ton compressors, electrically driven, with condensers and receivers, oil interceptors, gauge boards, condensing water pump, brine congealing tanks, scuttle butt and pump, constitute the plant. The steward's cold storage boxes contain about 2,000 cubic feet and ice making cans. A capacity of two hundred pounds in 25 hours have been provided.

The propelling machinery consists of two complete sets of vertical six-cylinder, single-acting, two-cycle, Sulzer reversible Diesels, rated at 1600 s.hp. each at 147 r.p.m. They were built by Sulzer Brothers of Winterthur, Switzerland, and shipped to Kiel for installation. Each engine has one scavenger pump, one multiple-stage air compressor and one lubricating oil pump attached. The cylinders bore and stroke are 18½ in. x 32½ in. A fuel consumption of 0.42 lb. per s.hp. hour is expected.

For the generation of electricity, one 65-KW and two 32½-KW 110 Volt d.c. generators are employed. Each of these is driven by a Sulzer airless-injection type Diesel. In the engine room are two American made 100-cell Edison storage batteries, having a total capacity of 800 ampere hours, to be used for emergency and port lighting. A complete R.C.A. system of radio transmitting and receiving has also been installed, as well as a Kolster radio compass.

The Lux-Rich system of fire protection is provided in the engine room, galley and lamp room. Pneumercator measuring gauges are fitted to all double bottom and deep tanks. Propellers are of the solid bronze type.

Nourmahal's Principal Dimensions and Capacities

Displacement (long tons)	2760 tons
Length overall	263 ft. 10 in.
Length w.l.	260 ft. 0 in.
Beam	41 ft. 6 in.
Draft, mean load	16 ft. 0 in.
Fuel capacity	513 tons
Fresh water	253 tons
Cruising radius	16,000 sea miles
Fuel capacity days	48
Gross tonnage, about	2,000 tons
Net tonnage, about	1,200 tons
Power	3,200 s.hp.
Sea speed	15 knots
Daily fuel consumption at 15 knots,	about 12 tons

Two specially built fast launches are provided for the use of the owner. One crew's launch, one power whaleboat, and two 24-foot metal lifeboats, all hung on swinging type davits, comprise the small boat equipment. There are two teakwood accommodation ladders, the one on the starboard side being for the owners' use and the port ladder for the crew.

The Well-Lighted Motorship Engine Room

By Roger A. Lea

SINCE a ship must carry its own power plant, good lighting aboard is a much simpler problem than it is for factories and stores on land, which must pay as high as seven cents per K.W.H. for all additional current needed for a good lighting system. On shipboard the auxiliary engine can usually supply the increased amount of current required for a good lighting job over and above the amount consumed by a poor lighting system. And the increased cost of energy would not be over three-quarters of a cent per K.W.H.—generally less than one-half cent—representing all of the additional cost including the fuel.

The results obtained by added expenditure for good lighting speak for themselves. False steps and unseen dangers are avoided. Fewer accidents occur under adequate illumination. Beside being a safeguard against accidents, good lighting is of great aid to the men working over machinery. They perform their work without uncertainty or error. They do better work and take less time to do it.

Competent authorities concluded, after extensive tests, that ample illuminating pays for itself because it preserves the morale of the crew, gives them confidence in their own ability and in the employer for whom they work. It was also found that corners in shadow are catch-alls for dirt and rubbish which does not exist with ample illumination.

There should be adequate light but no glare. Each class of work area requires a certain level of illumination. The prescribed light levels in standard land codes are also correct for marine usage. Roughly estimated, 0.1 watt per cubic foot of space in the engine room will produce good lighting.

One hundred watt lamps or larger should be shielded. Since glare is injurious to the eyes, they should be hung at least eight feet above the floor, and larger lamps proportionately higher. Diffusing globes should be used with such lamps or bowl-frosted lamps employed. Reflectors should be used with general overhead lighting units to throw most of the light down on the working plane. Then, too, lamps without reflectors under gratings annoy the men working on the upper level.

White walls and ceilings are a boon to good lighting. Almost all the light falling on a black surface is absorbed. When this same light falls on a clean white surface less than one-fourth of it is wasted. However, most marine engine rooms are kept almost spotless; a big help in obtaining maximum efficiency from the lighting system. White walls also serve as diffusing media whereby the light falling on them is reflected out in all directions producing a smooth level of illumination on all objects in the room.

Twin screw motorships have two rows of cylinders, one on each side of the engine room, the total height being anywhere from a few feet to forty or more. The controls on the large Diesels are usually mounted on the sides or at the bottom between the two rows. The various columns and gauges that are near these must be well lighted. Lamps equipped with ordinary reflectors will be found satisfactory for this purpose. Elliptical angle reflectors can sometimes be used to advantage, if they can be mounted so that the operator will not have to work in his own shadow.

Electrical switchboards and indicator panels may be satisfactorily lighted with bracket units mounted at the top of such boards or by building up sufficient general illumination in the room so as adequately illuminate them.

Marine lighting systems are usually 115 volts or 230 volts, the former being preferable. The lower voltage lamps cost less, stand vibration better, and are more universally obtainable. Electrical insulation is simpler in the lower wattage systems. All fixtures and conductors must be protected. Lead covered cable in armor should be used in the engine room and like areas. The lead protects the wire against moisture while the steel armor is a safeguard against mechanical injury. Lighting fixtures should be non-corrodible and should be equipped with a water-tight glass globe, protected by sturdy metal guards. Manufacturers can supply either clear or frosted globes.

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Interesting News and Notes from Everywhere

During the month of May, 1928, a total of 80 oil-engined vessels were registered with the Bureau of Navigation, Department of Commerce.

Harland & Wolff have received an order from Huddart, Parker & Co., Ltd., for a passenger-cargo motorship for the Australian trade.

McIntosh & Seymour have under construction a Diesel of 1200 b.hp. to be installed in a dredge to be completed January, 1929, for the United Dredging Co.

An oil painting of the new motorship LOS ANGELES has been given by the owners to the City of Los Angeles, Calif. The painting was recently accepted by Mayor George E. Cryer.

Osaka Shosen Kaisha have ordered three modern 11,000 ton cargo motorships for service between the Orient and Australia, according to advices from Japan.

A motor tanker of 620 ton d.w.c. was launched June 14th by Swan, Hunter & Wigham from their Neptune Works, Newcastle-on-Tyne. This vessel is building to the account of the British Tanker Co., Ltd.

Trials of the Bessemer Diesel-driven motor-yacht CARMARGO, owned by Julius Fleischman of New York were due to be run as we closed this issue of MOTORSHIP to the press. Illustrations and details will be published in our September issue if the trials are run in time.

In twelve months' service (365 days) the motortanker LUMEN has been at sea under power 311 days, or 85 per cent of the total service time. The LUMEN is propelled by twin 1250 s.hp. Brown-Sulzer Diesel engines.

For the next three years the Shipping Board will be enabled to obtain its fuel oil requirements at very low cost as bids recently received by the Fleet Corporation range from 75 cents per bbl. this year delivered at Gulf ports to $1.35 per bbl. at New York for a 3-year period. Eight of the leading oil companies were bidders.

C. M. Baldwin of Swift & Co., Ltd., was a guest at the launching of the HIGHLAND CHIEFTAIN at the Harland & Wolff shipyard, Belfast. This vessel is a sister motorship to the HIGHLAND MONARCH described in the June issue of MOTORSHIP. She is intended for operation in the passenger, general cargo and refrigerated cargo trade between the United Kingdom, Brazil, and the Argentine, via Spain and Portugal.

The motor yacht GUINEVERE has recently been repowered with two new late-design Winton Diesels, developing a total of 800 horsepower, replacing two smaller Wintons with which she was powered.

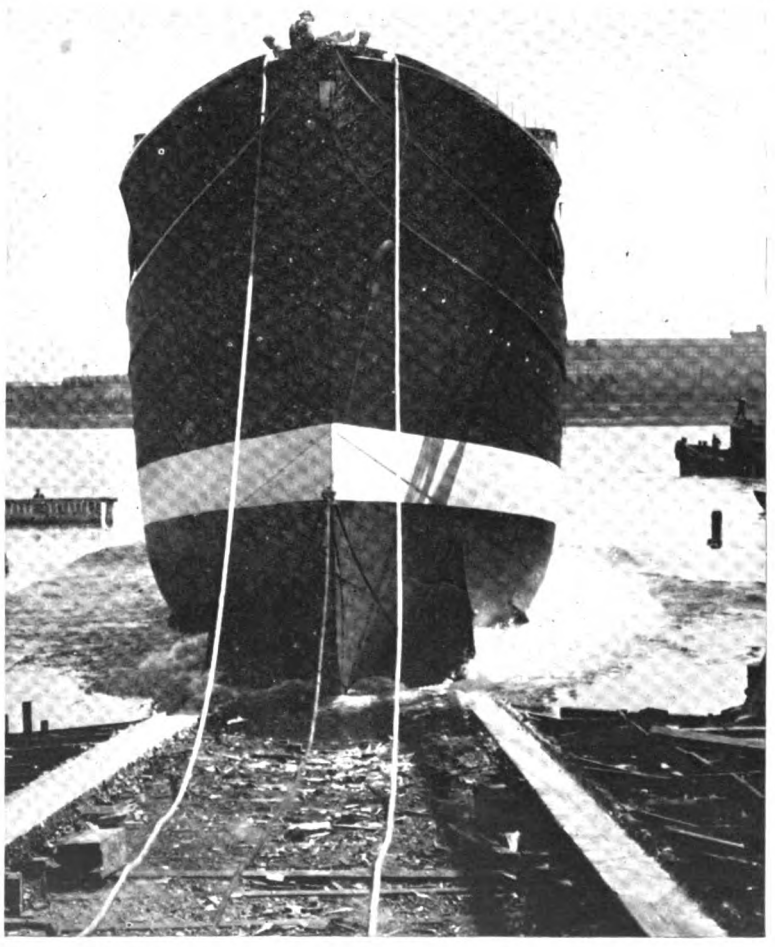
Now completing in Italy for sea trials in September is the motor-yacht ILLYRA for Cornelius Crane, Jr., of New York. Her twin 300 s.hp. Bessemer Diesel engines are being installed by the yacht builder, Marco U. Martinolich, of Lussin-Picolo.

According to a recent report, Alexander Winton has produced a single cylinder experimental high-speed radial oil engine, which ran two weeks steady on test at 2,800 r.p.m. Mr. Winton expects that this engine when fully developed will be suitable for aviation work.

The use of motorliners for cruising is steadily increasing due to the particular advantages of this type of ship. Announcement is now being made that the Hamburg-America new liner ST. LOUIS will make a cruise to the Mediterranean and the Orient from New York commencing Jan. 31, 1929.

Burmeister & Wain reports June 1, 1928, list of motorships equipped with Diesel engines of the B. & W. type to be 376 ships with an aggregate of 1,255,880 i. hp., and of 4,307,-435 gross tons. And in addition 117.526 i.hp. of marine engines for submarines, auxiliary purposes, etc., are under construction or on order.

Orders received by the General Electric Company for the three months ending June 30 amounted to $90,431,957, compared with $78,105,247 for the corresponding quarter of 1927, an increase of 16 per cent, President Gerard Swope has announced. For the six months ending June 30, orders received amounted to $170,357,797, compared with $155,655,828 for the first six months of last year, an increase of 9 per cent.



Launch of the Bessemer Diesel-engined yacht Camargo, building for Julius Fleishman

Opening of the bids for the machinery for the two Diesel-electric ferryboats for the Manhattan State Hospital, Wards Island, N. Y., service has been postponed from July 6th, by William M. Acheson, Chief-Engineer, Division of Engineering, Department of Public Works, State of New York, Albany. The opening date will be announced later.

Work is progressing on the 12 auxiliary Diesels of 500 hp. each, building at the Nordberg plant for the shipping board, according to a recent letter from R. Wintzer, Chief-Engineer of that organization. The names of the ships in which these engines will be installed is not yet announced. One generator and one generator and compressor engine will be installed in each of six ships.

Four motorships are mentioned on the Shipping Board, Fleet Corporation, Fuel Conservation Section Honor Roll as follows: WILLIAM PENN, Captain R. Wright and Chief-Engineer A. Pancott; CROWN CITY, Captain H. T. McCaw and Chief-Engineer J. D. Cody; WEST CUSETTA, Captain D. Holth and Chief-Engineer D. F. Mentzer; CITY OF RAYVILLE, Captain N. Lekines and Chief-Engineer A. T. Engelbretsen.

The Swedish-America-Mexico Line of Gothenburg, operating a fast freight service between American and Scandinavian and Finnish ports, in conjunction with the Swedish-American Line, has placed an order in Sweden for a new freight motorship to be delivered in September of next year for Gulf traffic. The new vessel will be of about 6500 tons and will make a speed of over 12 knots.

Maurice Oudin, Vice-President of the International General Electric Co., was signally honored by the King of Italy. In recognition of his good offices in behalf of a closer international relationship and of the specific benefit to the engineering profession of Italy, Mr. Oudin was decorated with the Order of Commander of the Crown of Italy. The rank of commander is a high honor, and is rarely bestowed upon a foreigner.

A good indication of the success of trans-ocean passenger motor liners is to be found in the announcement that the Swedish-American Line has ordered a third Diesel liner to augment the service now being given by the GRIPSHOLM, and which will be added to by the KUNGSHOLM when she goes into service shortly. The new and third motorship will be of 20,000 hp., 26,700 tons displacement, 19,-000 tons gross registered, and 18 knots speed, so will be much the same size as the KUNGSHOLM.

A radically new asphalt marine paint has been developed by Dupont. It is an emulsion of asphalt and water in which chromium salts are added to render ferrous metal "passive" to corrosive action while the water medium is drying out of the paint. When dry, the coating is practically pure asphalt because neither solvents nor cutback ingredients are used in making the emulsion. Owing to

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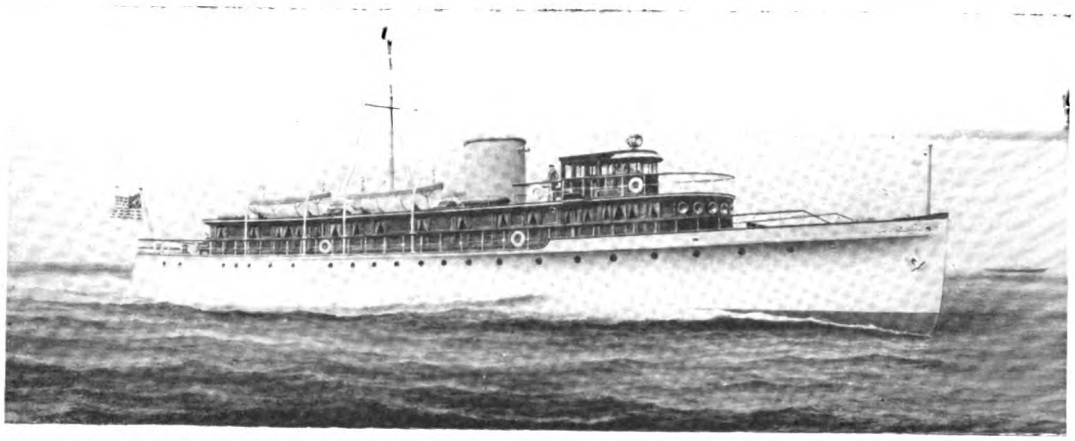
the absence of volatile solvents, no explosive or toxic vapors or gases are thrown off and it may be safely used in confined spaces.

According to a recent report of the Swedish-American Line, the motorship KUNGSHOLM will make two 17-day cruises from New York to the West Indies. The KUNGSHOLM is a sister ship to the famous GRIPSHOLM. She will arrive in New York about December 1st on her maiden voyage and sail on the first cruise about December 19th. With her 26,700 displacement tonnage, 20,000 horsepower and speed of 18 knots, the KUNGSHOLM will have accommodation for 1600 passengers, but the number of cruise passengers will be limited to only 450.

An order was recently placed by the Hamburg-American Line with the Wilton shipyards at Rotterdam for the construction of a twin-screw motorship for its Pacific Coast European service. The new ship will be 490 ft. long, 54 ft. wide. Her carrying capacity will be 12,000 tons d.w.c. Refrigerating space is to be provided to the extent of 4,100,000 cu. ft. for perishable cargo. Main Diesel engines of power not yet announced will be Harland & Wolff-B. & W. A speed of 14 knots is expected. Accommodation for 24 first class passengers will be provided.

The new motortanker GLITTRE recently proceeded on her first voyage from Oslo to the Gulf of Mexico, where she will load gasoline for a port in France. She was built by Götaverken for Fearley & Eger. The GLITTRE is Götaverken's third 9000-ton tanker completed this year. Her principal dimensions are length 407 ft., beam 55 ft., depth 32 ft. 3 in. and draught 25 ft. 4 in. Propelling machinery consists of two six-cylinder four-cycle single-acting Götaverken-B. & W. Diesels of 1500 i.hp. each. On the trial trip, June 21st, these engines together developed 3350 i.hp., and the ship's highest average speed was 12.1 knots.

A direct service from Montreal to the River Plate is being carried out with three motorships of the Linea-Sud Americana (Garcia & Diaze, New York, managers). The vessels engaged in the service are the twin-screw motor freighters TERCERO, MURJEK and PRIMERO. They are scheduled to make the trip from Montreal to Montevideo in 26 days. For the present, the service will be monthly. The TERCERO arrived in Montreal on June 13th from Buenos Aires. Motorships of the long voyage types have been, up to the present, somewhat rare in the great Canadian inland port and the waterfront is particularly



Two, 12-cylinder, V-type, 3000 hp. Treiber Diesel engines, described in our July issue, will be installed in this 40 mile yacht

struck by the spick-and-span appearance of the new visitor, and by the absence of clatter in handling cargo brought about by the use of electric winches. Even when alongside the ship, it was difficult to realize, by hearing at least, that cargo was being handled at all hatches. The Montreal agents for the three ships are McLean, Kennedy & Co. The TERCERO sailed from Montreal on June 20th.

Harland & Wolff made delivery on June 14th to the King Line of the 5280-ton motorship KING STEPHEN. She is a vessel with straight stem and cruiser stern, the principal dimensions of which are: length 400 ft., beam 54 ft. 6 in. and depth 34 ft. 8 in. Her main propelling power consists of one six-cylinder Harland-B. & W. single-acting four-cycle Diesel. The auxiliary and deck machinery is all electrically driven.

Arthur B. Birge, Secretary of the Standard Unit Navigation Co., Nashville, Tenn., writes to MOTORSHIP, with reference to the SUNCO A-3 described in our July issue. "Our boat left on its first trip up the river, the kinds and amount of freight we handled is exceedingly encouraging. We had as much as our barge would hold. We had a fine list of commodities, such as cultivators, seeders, shovels; all kinds of groceries, such as sacks of flour, coffee, rice, sugar, bags of different kinds of grain, canned goods; millinery and dress goods; hardware of practically every description, including bar iron; kegs of horseshoes, go-carts, beds, kitchen cabinets, tables, linoleum, barrels of paint, and various other sundry items. This shows a very hearty cooperation on the part of Nashville merchants to resume water transportation."

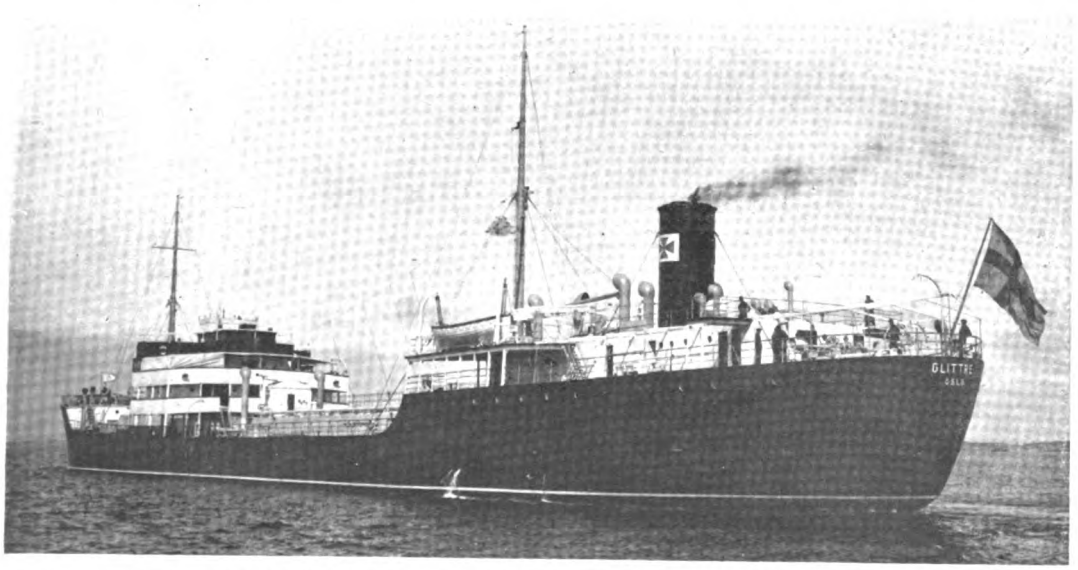
The 9000-ton d.w.c. motorship VICTORIA, a general cargo ship, built by the Nakskov Shipyard, Nakskov, Denmark, recently was delivered to her new owners, the Steamship Company "Orient," Ltd., of Copenhagen. Trials were run June 26 in the "Langelandsbaelt."

The State of California Polytechnic School, San Luis Obispo, Cal., is now installing a 120 hp. Western Enterprise Diesel to operate a generator supplied by Westinghouse for general power and lighting purposes. This engine will also be used for practice and study as this is a mechanical school having from 350-400 students.

The highest power yet developed from a Diesel cylinder was 3500 i.hp.—achieved by Sulzers with the aid of supercharging, and 3,000 i.hp. without supercharging. This was from a single cylinder double-acting two-cycle engine of 35.43 in. bore and 55.12 in. stroke. This cylinder has a normal load of 2,000 b.hp. at 100 r.p.m. Incidentally, Sulzers have also produced the largest single-acting Diesel engine in the world. This engine develops 7,000 b.hp. at 115 r.p.m. from eight cylinders 32.28 in. bore and 56.69 stroke. This is a direct reversible marine engine.

Motorship construction continues active at Belfast. On the berth cleared by the launching of the HIGHLAND CHIEFTAIN is to be laid the keel of the new 20,000-ton motorship for the Union Castle Line. The 26,000-ton motorship OCEANIC for the White Star Line is now completely framed while three passenger motorships for the Belfast Steamship Co. have the double bottoms laid down. The remaining two vessels for the Nelson Line, similar to the HIGHLAND CHIEFTAIN, are in advanced stages of plating. The new forepart of the Royal Mail motorship LOCHMONAR, which is to be joined to the existing afterpart, will be launched August 2nd.

The Shipping Board announced June 22nd "that it was the sense of the Board that mail contracts under the Jones-White shipping legislation should provide for new or improved vessels for the service, the first of such vessels to be entered on the service not later than three years after the signing of the mail contract." There is no question but what the Board has made a correct interpretation of the purpose of Congress in enacting the Jones-White Act, which is "to build up a privately owned American Merchant Marine comparable in *quality* to the merchant fleets of other nations." The word quality draws attention to an unmistakable trend toward the complete discontinuation of steamship construction in foreign shipyards, and the rapidly appearing preponderance of large highly economical motorships with which the American merchant marine is already compelled to compete.



New Götaverken-built motor tanker Glittre, discussed on this page

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Motorship Construction Gains—Steamers Decline

Lloyds' Report for Quarter Ending June 30th Discloses 340,000 Gross Tons More Diesel-Driven Vessels Building Than All Other Types Combined. Nearly Half-a-Million Less Tons of Steamships Now Building Compared with January 1st.

RIGHT in the face of a decline of more than 230,000 gross tons in the volume of merchant ships now being constructed all over the world, Diesel motorship construction shows a small increase, according to the figures just issued by Lloyds Register of Shipping. It is significant at the end of March last that Great Britain and Ireland were building almost as much shipping as all other countries combined, but are now constructing only 45.1 per cent. It is significant because, while *motorship* construction is not leading in Great Britain and Ireland, it does represent nearly two-thirds of the work in the shipyards of all the other maritime countries taken together.

Lloyd's points out that the share of the United States in world shipbuilding has improved a shade, moving from 1.9 per cent to 2 per cent. The American Bureau of Shipping figures also just published include 43 vessels in 20 shipyards, ranging from 18,500 tons gross down to 200 tons gross. They include two Diesel tankers of 9074 tons and 3700 tons respectively. As yet the result of the passing of the new American Merchant Marine Act has not had time to make itself felt, plans for new ships still being in the drawing stage.

Lloyd's returns for the world's motorship construction show that France and Sweden, especially, are devoting an increasing proportion of their ship construction to this type of vessel, and are making it the bulk of their output, as are Italy and Denmark. Lloyd's gives the following comparison of motorship production between the last two quarters in gross tonnage:

Motorships Building

	June 30, 1928	March 31, 1928
Great Britain and Ireland	546,826	573,546
Germany	190,255	212,015
Italy	122,620	126,740
Holland	103,850	110,393
Sweden	99,050	90,100
France	98,850	68,400
Denmark	94,893	99,400
Other countries	244,200	210,273
World total	1,500,544	1,490,867

The growth in the trend towards motorship building is indicated clearly in the comparison of construction of types of vessels during the last two quarters. At the end of March last about 90,000 gross tons more of motorships were in hand throughout the world than of all other types combined; but at the end of the June quarter, Lloyd's shows, the gap had been widened to over 340,000 tons; and in the same period the share of motorvessel construction in world production had grown from 51.5 per cent to 56.4 per cent. The contrast between the two periods is given in the following table of gross tonnage:

	June 30, 1928	March 31, 1928
Motor vessels	1,500,544	1,490,867
Other types	1,159,918	1,402,384
Total	2,660,462	2,893,251

While Great Britain and Ireland are devoting more than half of their present merchant shipbuilding program to other types than motor vessels, the other maritime countries, taken as a group, are now approaching the million ton mark in the volume of motorships under way. A comparison between the two groups is given as follows, in gross tons:

	Britain and Ireland	Other Countries
Motor vessels	546,826	953,718
Other types	655,784	504,134
Total	1,202,610	1,457,852

Declines are shown generally in the horse power of various types of marine engines and turbines being built or installed throughout the world, as compared with the first quarter of this year. The returns to Lloyd's give the total indicated horse power of Diesel oil engines now in hand as 1,252,960, as against 1,333,875 at the end of the March quarter.

The total indicated horse power of steam reciprocating engines building or being installed, is given as 491,750 for all countries, as against 549,910 in the previous quarter. For steam turbines, the total shaft horse power for all countries excepting Germany, for which returns have not been available, is given as 214,600, as compared with 277,600 in the March quarter.

A general comparison of the total shipbuilding for the last two quarters is given by Lloyd's as follows:

Total Ship Construction	June 30, 1928	March 31, 1928
Great Britain and Ireland	1,202,610	1,440,842
United States	55,502	56,049
Other countries	1,402,350	1,396,360
World total	2,660,462	2,893,251

Much of the proposed new ship construction for American owners is now reaching the more mature stage. MOTORSHIP expects that keels of close on a dozen ships will be laid by the end of 1928, so that official records for the period ending December 30th should be much more favorable to American shipping.

Mess Room Maxims and Fables

The man who is well recommended is never without a job aboard a motorship.

To tell what we know often intimates what we do not know.

Every man should have his station to keep clean, and every man should keep his station clean.

No man ever climbed high in the world by breaking his back at hard work, but many a man has reached his goal by compelling others to.

Men who shout the loudest at sea about how hard the "First" drives them are the ones who go ashore and brag about what a fine-running job they are on.

We may be absolutely certain that the low pressure alarm system will work if the pressure fails. But, we cannot be absolutely certain that the system will never get out of order, unless it is given the once-over occasionally.

The amount of engine-room supplies found in the storeroom does not always indicate the amount that is aboard the ship, nor can the amount that is on the ship be told by what is reported in the inventory.

In days gone by when we had our troubles with motorship machinery we were often given to understand that the engineers were incapable. Now that such troubles are overcome we agree that the engines have been perfected.

Speaking of inaccuracies in reports one is reminded of the fact that chief engineers have copious sleeves up which they are reputed to carry huge quantities of fuel. Although we are not prepared to state just how true this may be, we are inclined to believe that sometimes there is a reason. This reason is not based upon a perverse desire to shut out cargo and reduce the ship's earnings, but probably the survival of an old tendency to play safe. Fortunately the motorship chief may profitably have a pleat taken in his sleeve. His ship will run a long way on a few hundred tons of oil.

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Diesel Engine Users Society Formed

New Organization Beneficial to Owners of Marine and Stationary Oil Engines and Their Engineering Executives

ANNOUNCEMENT is made of the formation of the Society of Diesel Engine Users for the purpose of advancing the art and science of the installation, operation, maintenance and use of the Diesel engines. Also to further the interests of users of Diesel engines by collecting and circulating information on matters of mutual interest that arise from time to time in connection with the operation. Meetings and conventions will be held for fully discussing any such points and for the purpose of adopting courses of action that may collectively or individually concern users and give assistance in connection with the operation of their engines.

The rapidly growing number of Diesel engine users in this country hitherto have had no independent association to further its interests. The formation of the new society enables meetings to be held and problems discussed at length.

For many years there has been a Diesel Engine Users Association in Great Britain, which has been conspicuous by its success. Most valuable work has been accomplished so it is not surprising that it has a great many Amercian members. The American Diesel Users Society is quite independent from the British Diesel Users Association, but they will work in complete harmony and whenever possible will promote interchanges of ideas and information.

Membership of the Diesel Engine Users Society is restricted to actual users, owners and operators of Diesel and service ignition oil engines, such as power plant owners, shipowners, chief engineers and superintendents of installations on land, superintendent engineers of shipowning companies, marine superintendents, port engineers, chief engineers and assistant engineers aboard ship. Any company or person not qualified for full membership may be accepted as an associate member. Associate members can attend meetings and can take part in discussions when invited by the chairmen but are not entitled to vote or hold office.

APPLICATION FOR MEMBERSHIP IN THE

DIESEL ENGINE USERS SOCIETY

243 West 39th Street
NEW YORK CITY

Date.....

..... hereby make application for ..... membership in the DIESEL ENGINE USERS SOCIETY and enclose herewith the sum of ..... Dollars, the required annual subscription and initiation which is payable in advance.

Name .....

Title or Business .....

Address .....

Details of Oil Engines owned or operated .....

If not an Oil Engine user or operator, give details of business connection .....

Give two references .....

Send this application to the Secretary, Diesel Engine Users Society, 243 W. 39th Street, New York City.

(To fill in blank see extracts from the Constitution on other side)

REPORT OF ADMISSIONS COMMITTEE

We have investigated the qualifications of the above applicant and approve his admission to ..... membership.

Date.....

Chairman of Admissions Committee.

DUES: Each active member will pay an initiation fee of $5.00 and an annual due of $10.00 payable on the first of July. The proportionate subscription after March 31st is $7.50 for the balance of the year. Each associate member is to pay an initiation fee of $10.00 and an annual fee of $15.00.

Information of interest to users of oil engines is circulated from time to time among Members and Associate Members. A report of the proceedings is also sent to all Members and Associate Members after each meeting, so that those residing at a distance or unable to attend meetings may be kept informed as to matters of interest that are brought up for discussion.

Members experiencing any trouble or difficulty in connection with oil engines under their control, or who are desirous of obtaining information on any particular point, are invited to communicate with the Secretary, giving full details. The question raised can then be discussed by the Society and any resulting information of general interest can be circulated for the benefit of all Members. Associate Members may also send communications to the Secretary.

The offices of the Diesel Engine Users Society are located at 243 West 39th Street where all mail should be addressed.

Bids on Reconditioning Mt. Vernon and Monticello

Seven ship-building companies and three U. S. Navy Yards have been requested to bid on the re-conditioning of the former German-owned trans-Atlantic liners MT. VERNON and MONTICELLO.

An appropriation of $12,000,000 has been made by Congress for the work, and specifications were issued on July 16 to the following companies:

Morse Drydock and Repair Company.
Todd Shipyards, Inc.
W. & A. Fletcher Company.
Sun Shipbuilding Company.
Newport News Shipbuilding and Drydock Company.
American Brown Boveri Electric Corporation.
Bethlehem Shipbuilding Corporation.
U. S. Navy Yards at Boston, New York and Philadelphia.

Nine alternative plans, including one for direct Diesel-drive, have been prepared by Gibbs Bros. of New York, and four alternative plans for steam only have been prepared by the Newport News Shipbuilding and Drydock Company.

In our issue of June on page 499 we illustrated the Furness Withy line motorship PACIFIC PRESIDENT, and stated that she was built by the Deutsche Werke of Kiel and was equipped with AEG-B. & W. engines. We have been advised by the Deutsche Werke that in addition to building this ship they constructed her two Diesels aggregating 4200 i.hp.

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Thirteen More Mail Routes Certified

Requirements of Ships Built to Carry U. S. Mails Under Postal Subsidies Recently Enacted by Congress

JUDGING by the ship requirements just issued by the Shipping Board in connection with additional ocean mail routes, the Administration seems determined that only fast, modern vessels will be given mail contracts. Altogether there are 13 routes certified in the latest mail-carrying ship specifications, and the minimum speed on any route is 12 knots. This moderate speed is allowable on only one service, namely, cargo ships to certain Scandinavian ports. The maximum speed is 19 knots, the fast Atlantic service not being included in these particular mail routes.

The fairly high speeds required on most of these services are very favorable to Diesel propulsion, because the much smaller fuel consumption enables smaller ships to be built which will carry the same amount of cargo and passenger at the required speed. Provided the ships are designed as motorships, and not designed as steamers with Diesels asked as alternative power, the overall size of the motorships can be about 10% smaller and so will only cost about 5% to 7% more than the bigger steamers required to do the same work at the same *maintained* speed. This will allow the fuel, weight and space economy of Diesel power to be more fully realized. A certain amount of new ship construction is called for to ensure of the fleets being maintained in up-to-date form.

The additional mail routes certified by the Board to Postmaster General New at the beginning of July are as follows:—

1—New York, Port au Prince, Haiti, Kingston, Jamaica, Cartagena and Puerto Colombia. Combination passenger and cargo vessels with suitable refrigeration space, being of not less than 5000 gross tons and having a speed of not less than 16 knots, will be required.

2—Portland and Manila via Yokohama, Kobe and Hong Kong and the route between Portland and Dairen via Shanghai and Tsingtau and Takubar (Tientsin). Vessels designed primarily for the transportation of cargo but with provision for limited passenger service, being of not less than 4000 gross tons and having a speed of not less than 14 knots, will be required.

3—New York and other Atlantic ports, and ports on the West African coast, designated by trade route as the American West African service. Vessels designed primarily for the transportation of cargo but with provision for limited passenger service, being of not less than 4000 gross tons and having a speed of not less than 14 knots, will be required.

4—New York, Copenhagen and other Scandinavian and Baltic ports. Vessels designed primarily for transportation of cargo but with reasonable provision for limited passenger service, being of not less than 4800 gross tons and having a speed capable of maintaining 12 knots at sea in ordinary weather, will be required.

5—Galveston or Port Arthur and ports in Haiti, Porto Rico and Santo Domingo. Cargo vessels with limited passenger accommodations being of not less than 4000 gross tons and having a speed of 12 knots, will be required.

6—New York and La Guayra, Puerto Cabello and Maracaibo, Venezuela and Caracao, and Aruba, Dutch West Indies, calling at San Juan, Porto Rico. Cargo vessels with limited accommodations for passengers, being of not less than 3000 gross tons (gross tonnage limited by reason of port conditions) and having a speed of not less than 13 knots, will be required.

7—New York to Vera Cruz via Havana and Progreso. Combination passenger and cargo vessels, being of not less than 6000 gross tons and having a speed of not less than 15 knots, will be required.

8—New Orleans and Progreso. Combination passenger and cargo vessels, being of about 3000 gross tons (size limited by port conditions, shallow draft, etc., at Progreso) and having a speed of about 13 knots, will be required.

9—New York to Havana. Combination passenger and cargo vessels, being not less than 10,000 gross tons and having a speed of not less than 18 knots, will be required.

10—Boston, Mass., and Yarmouth, Nova Scotia. Combination freight and passenger vessels, being not less than 5000 gross tons and having a speed of not less than 19 knots, will be required.

11—Between San Francisco and Colombo, via Hongkong, Manila and Singapore. Passenger vessels of not less than 12,000 gross tons and having a speed of not less than 18 knots, will be required.

12—San Francisco and Manila, via ports in Hawaii, Japan and China. Twin screw, combination passenger and freight vessels equipped with appropriate refrigerating space for perishable cargo, being not less than 12,000 gross tons and capable of maintaining a speed of 18 knots at sea in ordinary weather, will be required.

13—Seattle and Manila, via ports in Japan and China. Twin screw, combination passenger and freight vessels, equipped with appropriate refrigerating space for perishable cargo, being not less than 12,000 gross tons and capable of maintaining a speed of 18 knots at sea in ordinary weather, will be required.

On the first five routes for which bids had previously been requested there were five bidders—one for each route at the maximum figure authorized by the 1928 Merchant Marine Act (see June MOTORSHIP).

The bidder on the route from New York to Buenos Aires, via Rio de Janeiro and Montevideo, and such intermediate ports at which the contractor's vessel may call, was the Munson Steamship Lines, New York, which bid $8 a nautical mile on Class 3 vessels of 18 knots speed and not under 12,000 tons gross. Contract awarded.

Route from New York to Casa Blanca, Genoa, Alexandria, the Piraeus, Saloniki, Constantinople, Constanza and other Mediterranean and Black Sea ports was bid on by the Export Steamship Corporation, New York, at $2.50 a nautical mile with Class 6 vessels of 10 knots and 4000 tons gross. Contract awarded.

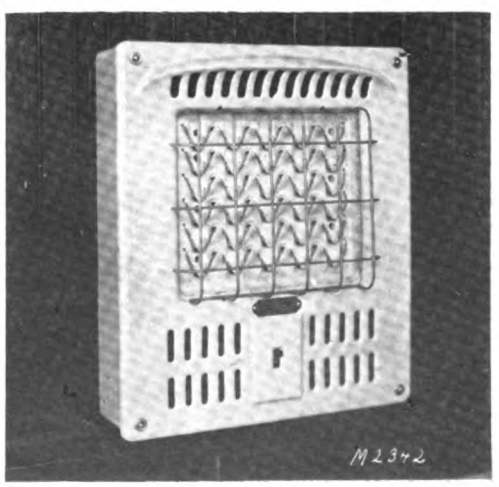
The American South African Line, New York, was the bidder on the route from New York to Cape Town, and other ports on the east or south coast of Africa, at which the contractor's vessel may call. The bid was $2.50 a nautical mile with Class 6 vessels.

The Grace Steamship Company, New York, was the bidder on the route from New York to Valparaiso and intermediate ports at $4 a nautical mile on Class 5 vessels of 13 knots and 8000 tons gross and $6 a nautical mile on Class 4 vessels of 16 knots and 10,000 tons. Contract awarded.

The New York and Porto Rico Steamship Company was the bidder on Route No. 10 from San Juan, Porto Rico, to Santo Domingo, Dominican Republic, at $4 a nautical mile on Class 5 vessels of 13 knots and 800 tons. Contract awarded.

New Electric Cabin Heater for Motor Vessels

Realizing the economies to be effected through the adoption of electric heat aboard Diesel-driven vessels of all types, MOTORSHIP has constanly advocated its use, wherever possible, in preference to steam heat. Regardless of the size of the vessels, the cost does not exceed one-half cent per kw. hour.



A new electric Solar Glow wall-type heater combining the two successful methods of heat distribution; namely, convection and radiation, has been produced by the Westinghouse Electric Manufacturing Co. Primarily designed and commercially adopted for homes, this marine heater for ship staterooms has been developed and manufactured with non-corrosive parts.

It consists of a metal box cadmium plated which can be either mounted flush with or on the surface of the cabin wall, a porcelain refractory brick heating element that slides into the box, and a white or cream enameled cast iron front frame provided with a monel metal guard over the element.

When the switch is turned on the glowing resistance wires throw out a strong beam of heat, warming the area immediately in front of the heater, similar to the heat rays of the sun. At the same time a portion of the heat is conducted through the refractory porcelain brick to an air space that has been provided in back of the element and a draft is started through the heater. In order to prevent the currents of hot air from coming in contact with the wall above the heater, a heat shield is placed above the element.

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Progress in the Art of Stabilization

Vessels of 10,000 Tons Displacement and Many Smaller Ones Have Had Their Rolling Suppressed by Stabilizers.

IN THREE PARTS—PART I

By R. W. Crowly

Advantages

ALTHOUGH today it is generally accepted that a vessel must be expected to roll if it goes to sea in all weathers, nevertheless when one takes a broad sweeping view of the possibilities afforded by our advances in science there is something very crude in the contemplation of the fact that we are willing to accept the rolling of a ship with the same impotence as the Phoenicians did 2500 years ago and more. To read how they stowed their cargo and made everything shipshape is to realize that in this direction at least there has been no progress since long before the Christian era.

Twenty years ago a progressive Scotchman, head of the David MacBrayne Line, of kerosene-engined motorships and steamers that has assured communications in the Western Highlands of Scotland for the better part of a century, came by the idea that if he could prevent a vessel from rolling he would be able to guarantee in practically any weather the safe transshipment of cattle from the shore boats meeting the steamer along that exposed coast where no harbors exist. Convinced of the economic value of the idea if it could be achieved, he put it to the test, but lost by a small margin because that machine had not been perfected. The apparatus he tried out was the invention of Schlick, chief surveyor for one of the big classification societies in Hamburg, whose premature death cut short the line of development he was pursuing. I refer to that early and little known commercial trial of stabilization, because my first vision of a shipping world one day turning to the adoption of the stabilized vessel was inspired by the visit I made to that little ship in 1909.

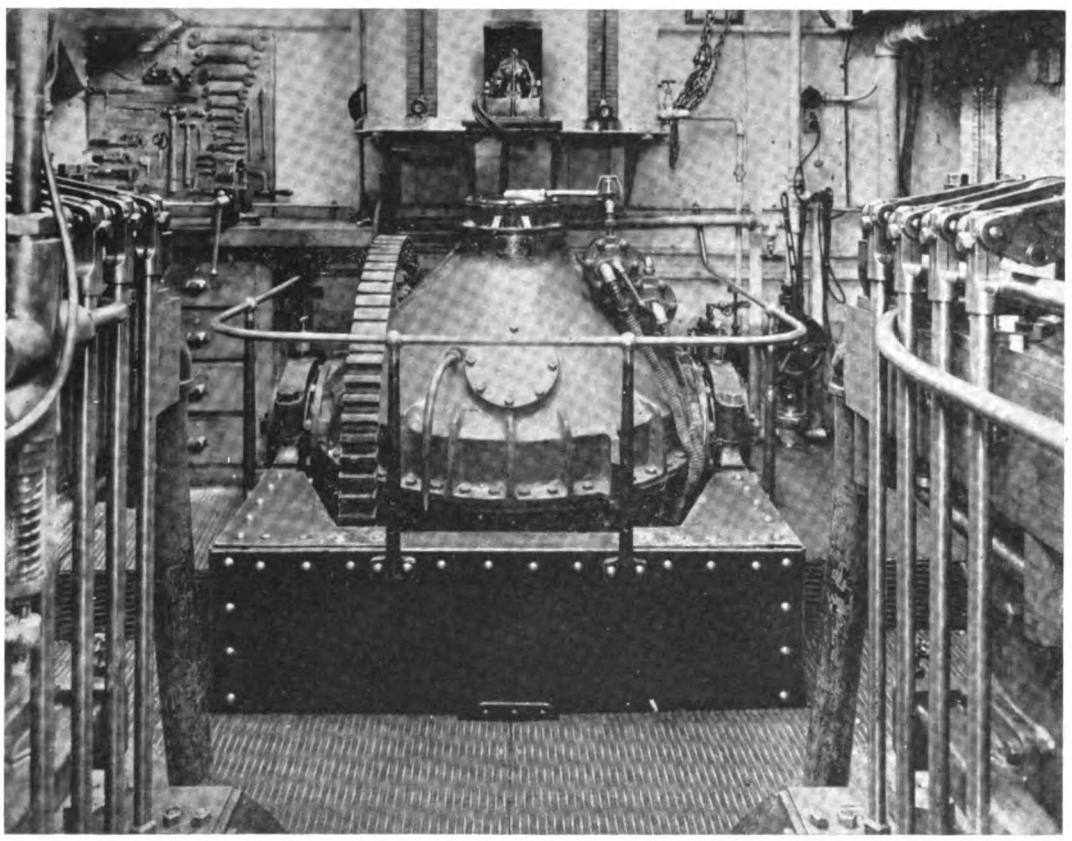
It pointed a notable lesson, namely that the service of shipping will be enlarged and improved beyond all present ideas when we come to thinking along the lines of a vessel that does not roll. If there could be a gain in stabilizing a small coastwise vessel working among the western island of Scotland, what would the gain be in stabilizing the much bigger freighters that load and discharge on the open roadsteads such as the ports of Mallendo and Valparaiso on the west coast of South America and in Central America, West Africa and other shores where harbors are not available? If cattle were to be protected from injury in landing on a small coastwise vessel off shore, would there not be a great benefit in protecting blooded stock from the buffeting of a North Atlantic winter crossing? It is not until one gets to thinking of the possibilities and to imagining the saving in damages, the gain in time, reduced insurance charges and other advantages that one can envisage the subject in the needful attitude of appreciation.

The Hamburg American Line in its prewar greatness under Ballin counted the advantage of a non-rolling ship in attracting the patronage of passengers, and in the VATERLAND and BISMARCK—now the LEVIATHAN and MAJESTIC respectively—tried out the Frahm anti-rolling tanks. This apparatus was entirely different to the Schlick equipment used in the little Scotch steamer and is of another character altogether than the Sperry stabilizer, but the purpose of all three types has been the same; namely, the prevention of rolling. That the desired action could seldom be fully obtained by the Frahm system is a matter of general knowledge. It suffered the great handicap of not being automatic, and a man could not control it quickly enough to cope with the very uneven wave motion of the North Atlantic; therefore it could not be more than a part time success and did not solve the problem.

One should note that both the Frahm and Schlick systems of counteracting the rolling of vessels were conceived by men deeply versed in buoyancy, stability, causes and effects of ship motions and the structure and stresses of ships, men who could be trusted in their understanding of the relatively small forces needed to do the work and the insignificant stresses caused thereby. Who Schlick was has already been told above. Frahm is the son-in-law of one of the founders of the Blohm and Voss yard in Hamburg and a director of the firm.

It is also worth while noting that the Foerster bulges on the post-war 20,000 ton vessels of the Hamburg American Line are a static resistance to rolling and indicate that the company still thinks of improvements along these lines.

Following the Frahm system came the Sperry stabilizer, which in the last 13 years has made real progress. A number of installations of this apparatus have been made in American vessels and several have been made abroad. A record of the principal ones will be given. It is a record of success. If you keep an open mind and are prepared to relinquish summary opinions you may have held for years on the subject of rolling, it is an instructive and inspiring record, and to many people will be impressive.



Equipment on the 290-ton Diesel motoryacht Aramis requiring only 12 horsepower for stabilization

Looking at the big freighters and passenger vessels of modern days we are apt to be awed by somewhat misleading ideas of the progress made in the last century. One hundred years of progress have contributed to shipping only three great fundamental improvements: mechanical power, steel construction and electricity, which, when brought to a common denominator, are found all to be factors of safety. Progress in marine transportation in the last century has been substantially the increase of safety.

We can talk of turbines, higher boiler pressures and superheat or of oil engines, their cycles and action, but we are dealing then with refinements and not fundamentals. Basically we are on the same ground as in talking of the machinery of the SAVANNAH, which made the first transatlantic passage recorded with the aid of steam and started man's emancipation from delays due to weather.

We can talk of MAJESTICS and LEVIATHANS, but intrinsically they are no more than the latest models of those iron and steel vessels which, three-quarters of a century ago, opened

(*Continued on page* 689)

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(*Continued from page* 684)

the way to bigger ships and above all marked the first stage in the conquest of the frightful fire peril that has now almost vanished from the seas.

We can talk of the wonders of electricity aboard ship today, the ventilation below decks, the radio communication apparatus, the gyro-compass, the radio-beacon spotter and all else, but fundamentally these all derive from the same power that in 1880 first lighted the Edison incandescent lamps on the ss. COLUMBIA (before any electric lighting service was sold ashore) and which in 1902 first gave long distance ship-to-shore communication in the case of the ss. LAKE CHAMPLAIN of the old Beaver Line, later purchased by the Canadian Pacific Railway to form the nucleus of its ocean fleets. The electric light spelled safety, with its suppression of oil lamps and candles, and in the early days of radio there was little thought of anything else than the C D Q. later changed to the S O S which still forms one of its chief benefits.

Let it be clear in our minds then that the fundamental improvements the last century has witnessed in marine transportation were largely in the cause of safety, which you may call reduced peril, greater insurance or aught else you will. We have worked only with machine power, brute strength and electric safety to be rid of the perils of fire, foundering, heavy fogs, stranding and collision.

Towards liberating a vessel from the same subjection to the motion of the waves that caused the Phoenicians to propound the elemental rules of good stowage we are just making a start. We have not begun to uncover the wealth of progress that will be opened up when we unchain our minds from the archaic notion that a vessel must still bob around in a heavy sea like a cork. Modern science has paved the way to the non-rolling ship. This may sound fantastic to many, but it is nevertheless true.

Nor is it only for special applications that the rolling of ships will be suppressed. A rolling vessel requires more power for propulsion. Captain McEntee, U. S. N., after making researches into this subject with the aid of models in the experimental tank at Washington, declared in a paper read before the American Society of Naval Architects in 1920 that each degree of roll from the vertical requires 1 per cent more power for the maintenance of speed.

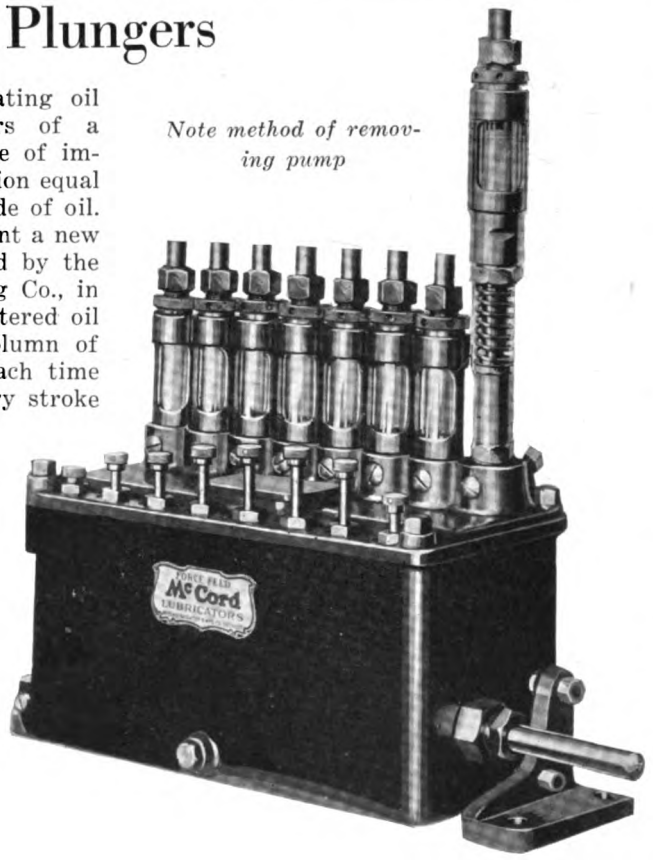
Connect up this fact with your own problems. A ship rolling 30 deg. average, i.e., 15 deg. average each side of the vertical, is absorbing an average of 15 per cent more power the whole time. If there be no margin of power available then the speed is correspondingly reduced. It is true a ship may roll at times when speed has to be reduced to prevent heavy seas breaking aboard and when a margin of power is therefore available, but this does not happen nearly so frequently as the rolling when full power can be maintained. In all cases, however, the rolling creates added resistance to propulsion. The loss can be measured in the ship schedule or in fuel, as you please.

Probably you have never thought of ship stabilization in these terms. Very few people have yet advanced beyond the point where they regard a stabilizer as nothing more than an invention. The thought that a stabilizer has a commercial value seems to have been perceived only by the little David MacBrayne Line in Scotland and the Hamburg-American Line. Actually the stabilization of ships is a fundamental improvement in marine transportation and will in the course of time prove to have become as big an influence in the shipping world as mechanical power, steel construction and electricity have shown themselves to be. We are on the threshold of this development, and a lot of current ideas will have to be revised. The younger generation going into the shipping business at the time this development starts will be the generation to carry the development to the full.

(*To be continued in September*)

New Type Lubricator With Differential Plungers

CORRECT methods of lubricating oil application to the cylinders of a Diesel engine assume a place of importance in their successful operation equal to that of selecting a suitable grade of oil. To meet adequately this requirement a new type lubricator has been developed by the McCord Radiator & Manufacturing Co., in which a sight glass shows the metered oil on its way to the engine. A column of water stands in the glass, and each time the pump plunger makes a delivery stroke a given amount of oil passes the delivery check-valve, and accumulates on a fine wire in the center of the glass.



Note method of removing pump

Oil delivery corresponds to the timing and displacement of the forcing plunger, due to the fact that both water and oil are incompressible at the pressures encountered. Since it makes no difference how many kinds of incompressible liquids are encountered in a continuous column, so long as air and other gases are excluded, it follows that the amount of oil delivered at the end of the line will equal the amount delivered by the pump. Water being heavier than oil, it must remain in the glass, merely rising and falling an amount equal to the size of the drop of oil. The latter builds up at the base of the wire, breaks away, and then travels leisurely upward to a pool of oil at the top of the water, from which point it passes through piping to the point of application.

Construction of the lubricator is such that each pumping unit may be removed by disconnecting the discharge line and loosening a single holding screw. If so desired the entire group of units may be removed intact by lifting the cover of the lubricator tank. Operation may be by means of ratchet or direct pulley, if timing is not required, or by worm-and-wheel or spur gear if timing is required.

Special attention has been given to accuracy in handling small quantities of oil per stroke of the plungers without employing many small or delicate mechanical parts. A special feature contributing to this result is the differential plunger which is lapped and ground to an accurate fit with two brass sleeves. Substantial dimensions of these parts is possible, because the amount of oil delivered corresponds to a cross-section area of the two.

The plunger is operated by means of a rocker-lever actuated by an eccentric cam. Return travel is limited by a stop and thumb-screw which adjusts delivery by changing the stop point, at which the rocker-lever is held, in relation to the cam. By selecting suitable differential diameters the feed adjustment can be made to cover any rate desired. Hand flushing, filling and checking is accomplished by moving a thumb-screw up and down.

The new McCord lubricator promises to meet with the approval of a trade that is becoming constantly more discriminating in its demands for accessories of substantial quality.

Large Motortanker Launched at Chester

The Sun Shipbuilding Company, Chester, Pa., launched the motortanker SUN on Saturday, July 14. This vessel was built for the account of the Sun Oil Company. She is to be powered with Sun-Doxford Diesel engines. This launching was the outstanding event of the month of July, because this vessel is the second largest under construction in America at the present time. Full details of the vessel and an account of her performance will be published in MOTORSHIP after completion of the dock trial and trial trip. Her principal dimensions are given below:

Length, overall	497 ft. 0 in.
Length, bp.	480 ft. 0 in.
Breadth, moulded	65 ft. 9 in.
Depth moulded to upper deck at side,	37 ft. 0 in.
Depth moulded to 2nd deck at side.	24 ft. 6 in.
Draft loaded	27 ft. 2 in.
Dw. carrying capacity	13,400 tons
Designed s.hp.	2800
Fuel oil capacity	611 tons
Capacity of cargo tanks	4,800,000 gals.
Dry cargo capacity	48,597 cu. ft.
Speed	11 knots

The SUN is of the two-deck type, with full poop and top gallant forecastle. She has a straight stem and semi-elliptical stern.

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Making Accurate Steamer-Motorship Cost Comparisons

Practice Current Among Shipowners of Designing Definite Hull and Asking Alternate Power Produces Misleading Results

COMMON practice among our shipowners today when additions to their fleets are required, is to have their new vessels designed as steamers and to call for alternate bids with Diesel power in the same hulls. This is the result of the force of habit of several generations of steamship operation. When our shipowners get out of this unfortunate and misleading custom, and realize that the motorship is entirely different, then they will be able to visualize the true economy and other benefits of Diesel or Diesel-electric drive.

While this practice remains in force motorships will continue to "cost" 10 to 20% more than steamers, and all that the owners will have in the resultant shipyard bids for comparison purposes will be the equivalent of conversions. In other words, the same hulls with Diesels substituting steam propulsion.

Common sense should clearly indicate to shipowners, their engineering executives, and technical advisers that the only accurate comparison of the two forms of power on various routes is to design the steamer as a steamer and design the motorship as a motorship. Their naval architects or shipbuilder should be instructed to design the respective ships to carry the same amount of cargo and passengers at a given maintained sea speed. It will be found that the Diesel-engined vessel will be nearly 10 per cent smaller overall than the steamer, meaning about that much less steel and power, so the higher cost of internal-combustion drive as represented by the completed ship will only be about 5 per cent or 7 per cent more, even if the Diesels actually cost 25 per cent to 30 per cent more than the slightly higher-powered steam machinery necessary.

One method of checking back on this statement is for the shipowner to have his vessel designed as a motorship of given net-cargo (not deadweight) and passenger capacity with a definite loaded sea speed. Then request alternate bids with steam power installed. He will find that it cannot be done without increasing the size of the hull, power, etc.

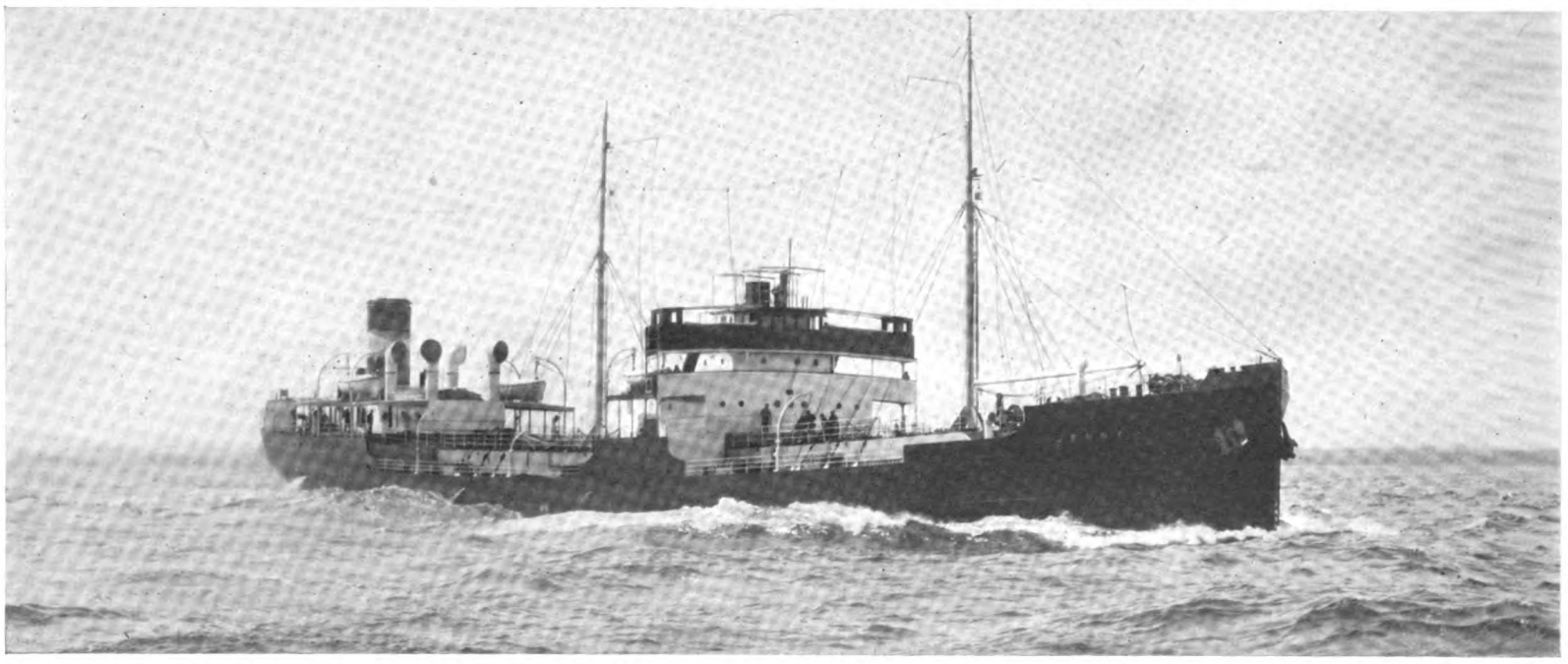
One beauty of Diesel drive is that the type selected can vary with the class of ship and service in which she will operate. For instance, if a long-haul route is in mind, then slow-speed, heavy duty, crosshead engines will have both economy and reliability without infringing on cargo or passenger space to anything like the same extent as steam plants with their big fuel and water requirements.

Where comparatively short runs between ports is in view then the higher speed, trunk-piston class of Diesel has reached a stage of reliability equal to its heavier crosshead brother up to 3000 s.hp. at 175-250 r.p.m. Such engines naturally occupy very little space, and allow of big cargo and passenger accommodation gains compared with any form of modern steam power, particularly if twin screws are adopted. The latter will somewhat increase the first cost of the ship, but not to any serious extent. Furthermore full advantage can then be taken of the savings in fuel and water space. This saving, while quite important, is not so apparent as with long distance route motorships because the steamer has opportunities of bunkering and taking water more frequently when on short runs.

Diesel-electric drive, of course, offers big savings in space for either long or short haul route vessels, and enables higher speed engines to be used where the shipowner has the courage to make the most of today's engineering experience and knowledge. Its first cost, however, still appears somewhat higher than direct drive. Gear drive, too offers much in the way of weight and space saving without greater first cost, and has been adopted far more extensively in Germany with Diesel propulsion than in our own country.

Shipowners, while admitting the operating economy of such big motorliners as the GRIPSHOLM and AORANGI have always made much ado over their higher first costs. But for some unknown reason they have treated lightly the fact that these two Diesel liners carry 15 per cent more passengers and 20 per cent more cargo than sister steamships. Actually they are bigger ships than their dimensions and tonnage measurements indicate. Too much stress cannot be placed on this fact. In reality they did not cost more than sister steam-liners, as the latter would have had to be built larger and have more power to do the same work at the same speed.

Getting down to brass tacks, the dimensions of ships mean nothing where comparisons in first costs of motor and steam vessels are concerned. It is what these ships can carry at a defined maintained speed which counts. What they can do and at what operating expense on a given first cost is what the shipowner should figure in terms of dollars and cents.



Example of a 1928 *British-built motortanker Jenny, lately completed by Swan, Hunter & Wigham Richardson, Ltd. Steam has almost been abandoned for the world's tanker construction*

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St. Roch, Arctic Patrol Schooner for Royal Canadian Mounted Police Service

THE Diesel schooner ST. ROCH, built for Royal Canadian Mounted Police service in the Canadian western arctic by the Burrard Drydock Co. of Vancouver, B. C., and equipped with a six-cylinder 150 s.hp. Union Diesel engine, was put in commission in June. Loaded with stores and supplies, she left on a trip to Herschel Island, which is the principal R.C.M.P. base in the Arctic.

Staunchly constructed on similar lines to exploring and trading craft, which have to batter their way through the ice pack, the ST. ROCH measures 104 feet in length over all, 95 feet b.p., 24 feet beam, and 12 feet moulded depth, with a draft of 11½ feet with 110 tons deadweight. She is built mainly of fir with the exception of the keel, stem, sternpost, and outer sheathing. The keel is an 11½ by 14 inch gumwood timber with a three inch gumwood shoe, and there are three 12 by 12 inch keelsons on top of the sawed fir frames, which have wooden fillers between, making a solid bed of timbers from the top or the keelsons to the bottom of the keel. The frames are 13½ to 7 inches deep, and 7 inch sided. They are put in in sets of double frames spaced 20 inches between centers, which only leaves 6 inches between them; while forward of the collision bulkhead the framing is solid.

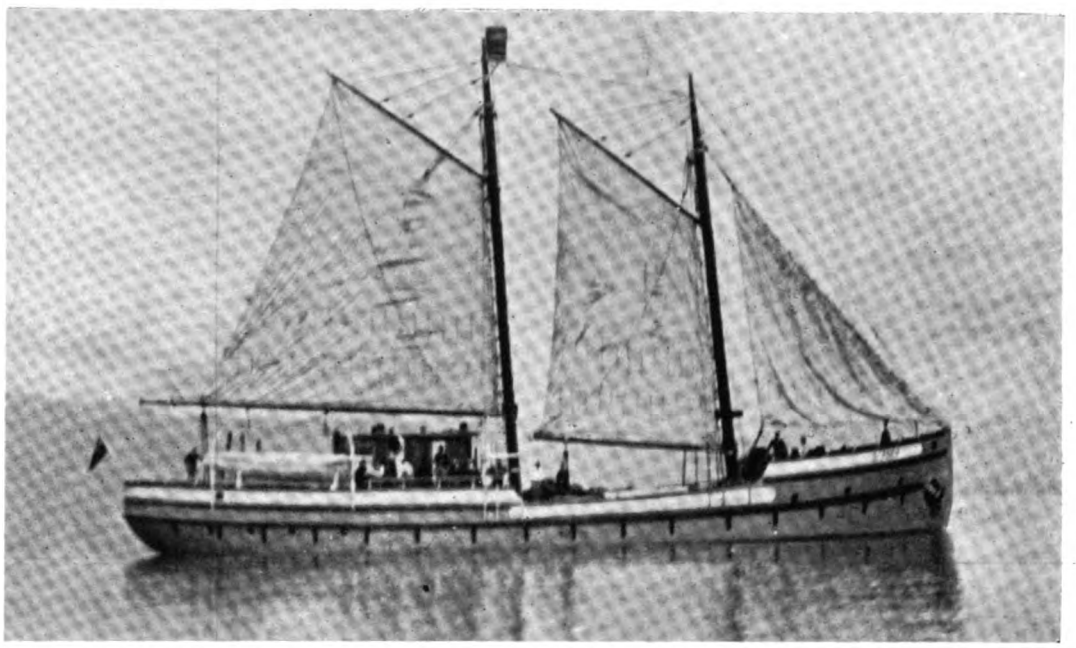
Deck beams 6½ by 8½ inches, and hold beams 9½ inches square which brace the hull just below the waterline, are well kneed. The planking of the hull and deck is 2¾ inch fir, and the inside ceiling 3½ inch fir, while there is an outer sheathing of 1½ inch ironwood, and at the bow an additional sheathing of ¼ inch steel plate.

This little schooner is a double ender, with forefoot cut away to allow the bow to ride up on the ice; while the rudder drops down through a well from the deck, and can be lifted out in case of being severely nipped in the ice. Her four-cycle Union Diesel engine, using airless injection of fuel, and reversing with a clutch, is rated 150 b.hp. at 330 r.p.m. It has 8¾ inch cylinder bore and 12½ inch stroke. On a trial run after the schooner was loaded, it drove her at 7½ knots at 330 r.p.m. There was also a dock side trial of three hours at 330 to 350 r.p.m. and three hours at half speed.

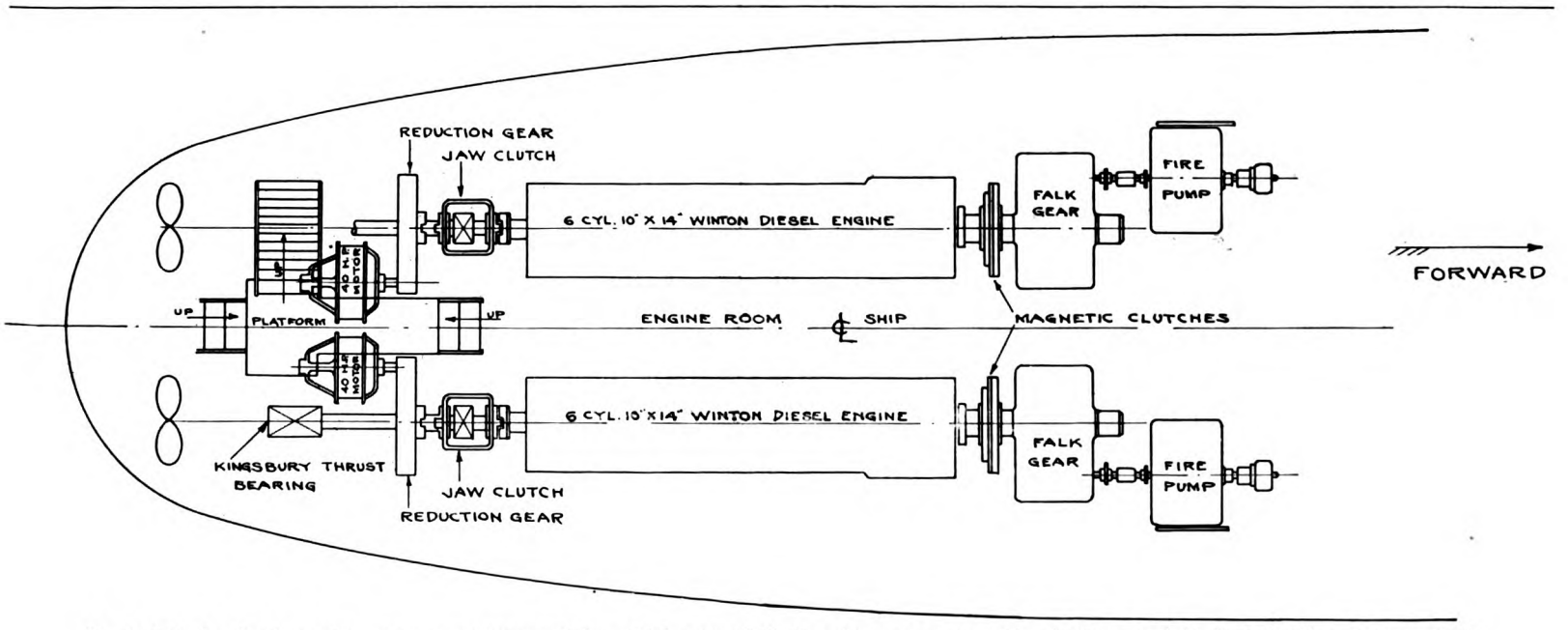
On account of the main boom of the schooner rig just clearing the top of the pilot house, it was not found practicable to use a stack amidships. So, the main engine exhausts through a large silencer on the port side of the poop deck just forward of the pilot house, and the auxiliary engine exhaust is carried up through the deck on the starboard side in a smaller pipe. Fuel tanks with a total capacity of 5200 gallons are installed in the wings of the engine room, and in the forward part of the hold, while the 1000 gallon fresh water tank is under the forecastle floor.

The general arrangement consists of engine room and officers' quarters aft, cargo hold amidships, and forecastle for the crew. The cargo winch is operated through a power takeoff from the main engine, while a messenger chain from this winch can be used for connecting up with the windlass on the forecastle head for heaving up the anchor.

On her Arctic patrol of the lands bordering the North West Passage, the ST. ROCH will be manned by a crew of ten, all members of the Royal Canadian Mounted Police force; but for the trip up to the Arctic, she will carry a captain familiar with that run, and also a qualified engineer from the engine builders. It is said that the Captain may remain in the Arctic with her for a year until the police get used to handling the boat themselves after which, he will turn her over to them.



A new field for the Diesel engine. Above is the Canadian Royal Mounted Police auxiliary schooner. St. Roch, used on the British Columbia Coast for Pacific and Arctic Patrol



Projected fire-boat engine room arrangement in which use of Cutler hammer magnetic clutches and Falk reduction gears would economize weight and space

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An Industrial Cheer-Leader

By F. Romer

THROUGH a cheese-cloth fog and a terrific storm, the captain of AMERICAN MERCHANT spent four days and three nights on the bridge. I asked him how he stood the strain. "It's easy—I've Nelsonized," he said. "When you think you've reached the limit of endurance put a mental mark at that point as the starting place; forget what's behind and look ahead with your original resolution to do the job. That's Nelsonizing."

I looked up Lord Horatio Nelson. After having been in action against the enemy one hundred and twenty times, in which service he had lost his right eye and right arm and had been severely wounded and bruised in his body, Lord Nelson really started sea service from that point which was even more brilliant than his unmatched exploits up to that time. Have you Nelsonized your life?

* * *

I've been out capturing data on distribution costs. Of thirty-five billions spent at retail thirteen billions of the consumer's cash were paid for physical distribution, and six billions for marketing by the manufacturers. In other words, only about twelve billions for raw materials and making the products, but nineteen billions for selling and delivering them to dealers!

Merchandising by wholesalers and retailers took just about four billions—so the middleman isn't the pay-the-fiddle-man at this dance of distribution. The efficiency sharks have turned belly up to bite holes into the fabric of modern business with the jagged teeth in these figures. Here's a fact they ignore. To sell necessities, staples, sets up no extraordinary cost.

But the major business of the world is now done in luxuries. Selling has become a matter of educating the world to new needs, new tastes, creature comforts, self indulgences that make life more worthwhile. I couldn't get you to return to standards of living that prevailed in the eighties. You don't expect all your modern privileges to be delivered on the standards of cost that prevailed in the eighties, either. All but the reformers, who deliver nothing but halitosis harangues, hold this view with you.

* * *

Because a thousand cars a day are assembled in its plant, is it big business? Because it has offices in all the principal cities of the world, or hires an army of people, or controls practically all the mineral deposits of a certain kind; because it is powerful enough to dictate price, to dominate a clique of bankers, to bully-rag and browbeat thousands of dealers—is it big business?

Isn't the real bigness of business something entirely different? Isn't it in the value of its service to civilization, the worth of its part in making millions happier? Isn't it in the warmth of regard it wins from the multitude, in the extent to which it compensates the many whose transactions maintain its existence?

* * *

I'm sure you have personally at some time experienced a sense of guidance that seemed to come inward from without, instead of outward from within. Many a business man got his biggest money-making hunch by telepathy—"out of thin air"—as he'd say. Ideas don't grow in the air. One mind puts a thought afloat on the ether; another picks it up. That's telepathy and—look out for this one—a proceleusmatic vibration. It simply means inciting, animating; rousing to action beforehand.

Diesel-Electric Ferries for Ward's Island

REFERENCE has previously been made in our columns to the two Diesel-electric driven ferryboats to be built by the Division of Engineering of the Department of Public Works of the State of New York. When completed, these craft will ply between New York City and Manhattan State Hospital on Ward's Island in the East River.

The ferries will be of the single-deck type, the upper deck to be used only for the pilot houses. The compactness of the machinery space enables vehicles to be carried in the center runway without any engine housing obstruction, and there are passenger cabins on either side of the vehicle driveway.

The hulls are steel throughout with cast-steel frames at either end, and are sub-divided by four steel watertight bulkheads per boat.

Designs of the vessels were produced by Eads Johnson, M.E., Inc., for the Department of Public Works, and the vessels will be built under the supervision of William M. Acheson, Chief Engineer, Division of Engineering, State of New York. The principal dimensions are as follows:

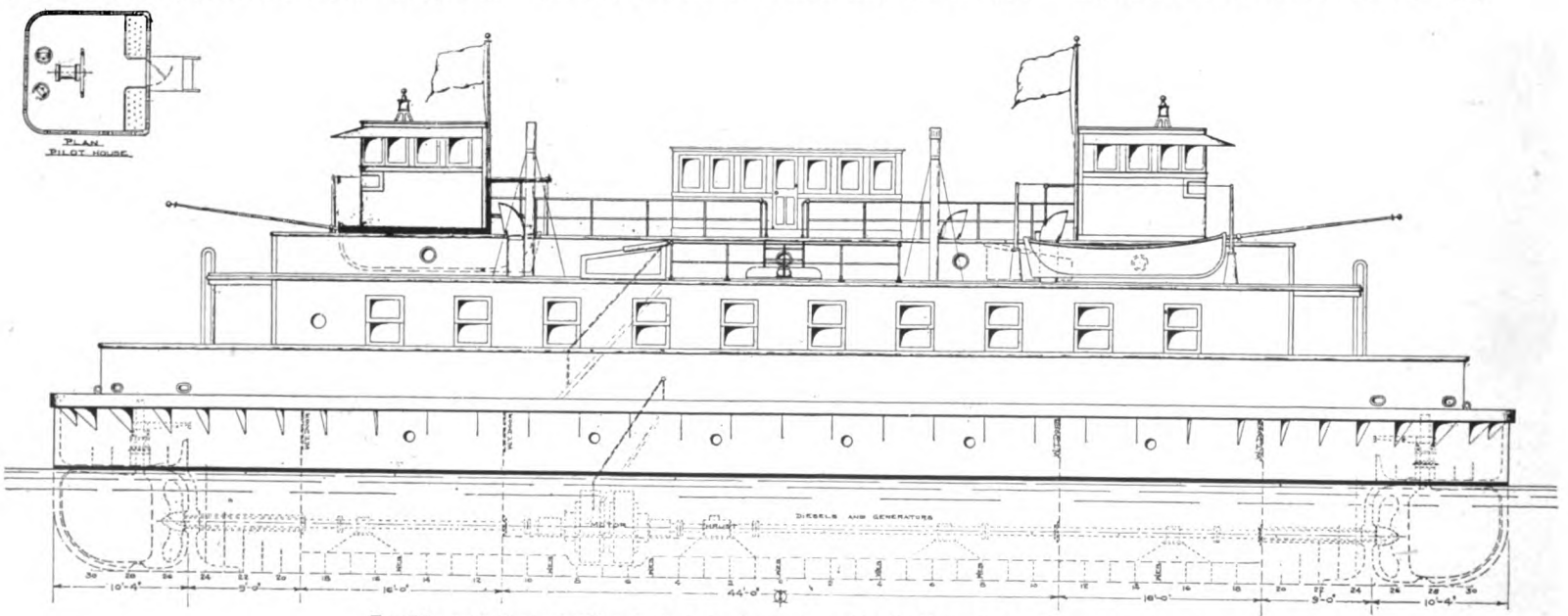
Displacement	320 tons
Length over all	115 ft. 6 in.
Length B. P.	94 ft. 0 in.
Beam over all	38 ft. 0 in.
Beam of hull at deck	33 ft. 0 in.
Depth molded	14 ft. 0 in.
Draft in S. W.	8 ft. 0 in.
Freeboard at ends	6 ft. 0 in.

In each vessel there will be two six-cylinder four-cycle Diesel engines of either air or airless injection type, delivering 250 b.hp. at a speed not exceeding 350 r.p.m. Each will be connected to a 160 kw. d.c. generator at 250 volts with a 30 kw. exciter at 125 volts on a common shaft. Specifications call for a fuel consumption not exceeding 0.46 lb. of fuel oil per b.hp. hour at full load, and 0.54 lb. at half load. The lubricating oil consumption must not exceed 0.004 lb.

These generators will supply current for a 400 s.hp. 500 volt electric propelling motor turning at 180 r.p.m. For auxiliary purposes there will be an Ingersoll-Rand air compressor driven by a 10 hp. motor and a Northern pump coupled to a 10 hp. motor. The pumps for circulating water, fuel oil, and lubricating oil will be mounted on each end. The builders are allowed to install them independently, but as a complete unit on a common bed plate.

There will also be a four-cylinder Diesel engine of 15 hp. connected to a 12-kw. generator for emergency lighting, but we doubt whether a four-*cylinder* engine of this power would be obtainable. We are inclined to think that a typographical error occurred in the specifications, and that this was meant to be 15 hp. *four-cycle* Diesel engine, especially as the four-cycle principle is stipulated in the specifications remaining.

For heating purposes, there will be one Ideal boiler furnishing steam to radiators in the engine room and cabins, but the pilot houses will both be electrically heated. Steering gear will be of the electric type.



Double-ended steel Diesel-electric ferry for Manhattan State Hospital service

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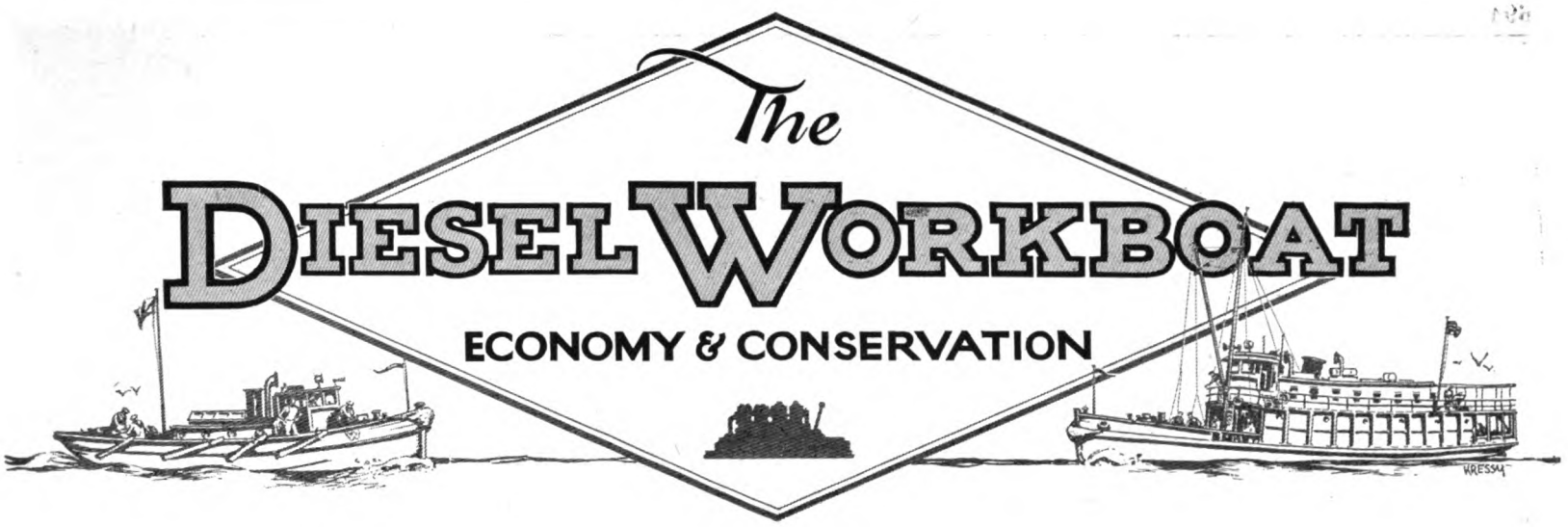


With the U. S. Coast Guard Diesel Boats

Motorship Representative Cruises Ten Days at Sea Aboard One of the Fleet of 46 Oil-Engined Patrol Boats Aggregating 15,000 Hp.

WHEN the National Prohibition law went into effect on June 30, 1920, the spotlight of public attention was suddenly focused on the Coast Guard. A new and highly romantic situation soon existed on our shores, especially near congested population centers along the East Coast—that of driving away the fleet of liquor-laden ships that hung close by the then three-mile limit. Rum Row was the name given to the anchorage. Not since the days of slave trade was there a tougher band of seafaring men to deal with. Efficiently organized, backed by great wealth and playing for high stakes, they stood like a row of ancient pirates—but more modernly equipped—waiting to land their cargoes by speedboat and aeroplane to shore. Their wily captains used every devise to beat the Coast Guard, and it was necessary to reorganize the method of defense and to place a heavier barrier near the big cities. But meantime daring exploits and clever propaganda caught the public's eye. It was at once apparent that the prevention of smuggling of this newest form of contraband constituted a prodigeous task which would require all of the skill and daring of which the Coast Guard is justly proud.

Until the activities of this Rum Fleet became widespread, the Coast Guard fleet was made up of first and second class cruising steam cutters, destroyers, special patrol ships such as the BEAR and NORTHLAND and small harbor ships. It was soon found that combination of fast destroyers and slow heavy steam cutters would not stop the captains of the fleet from landing their cargoes. Until the three-mile limit was changed to twelve, the rum ships used to stand in line, and the deep draft, heavy, Federal craft had little effect at stopping fast speedboats from contacting at night or in the fog, and running their cargoes ashore while the mother ships stood well out of danger.

In order to combat this practice it became necessary for the Coast Guard to undertake a program of construction of two special ship types that would allow the close spacing of patrol boats along the coastline and provide speedy shallow-draft patrol service in the harbors. Accordingly during 1924-1927, a total of 198 fast gasoline driven 75-footers were built, as well as a fleet of specially designed 100 and 125-foot Diesel-driven patrol ships, that have speedily found a distinct place in the scheme of policing the high seas.

With the addition of nearly 250 patrol boats, the Coast Guard Fleet is now made up as follows:

(A) 25 fast destroyers for offshore work. Average 1,100 tons displacement.

(B) 17 first and 16 second class cruising cutters, steam driven and of the heavy type, averaging around 800 tons displacement and of moderate speed. This class of vessels formerly did most of the patrol work offshore, but as they were built for an entirely different service and are the wrong type for this class of duty.

(C) 198 small, light, 75 footers. These are gasoline powered and mainly used in picket duty and shore patrol, with an occasional ocean duty in calm weather. This class came in great demand for running the coast blockade against the Rummies.

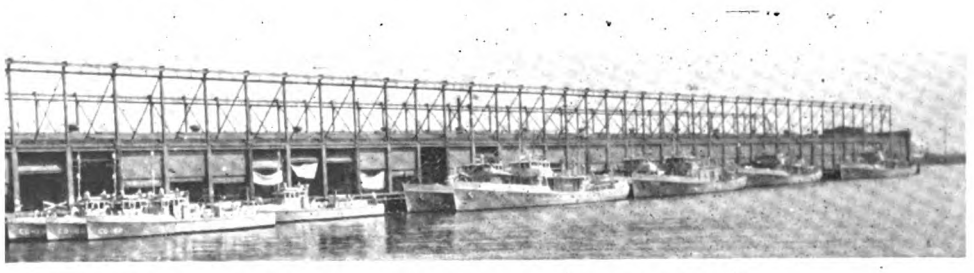
(D) The newest and most modern, the fleet of forty-six 100 and 125-foot Diesel patrol ships of 220 tons displacement, which have largely replaced the heavier steam-operated patrol boats of the older type.

(E) 38 fast harbor launches and cutters, chiefly used to patrol anchorages, wharves and special harbor duty.

(F) 112 open and cabin type, picket boats, mostly fast shallow draft boats for use at strategic points near harbors, and on shallow harbors where contraband may be hidden or a gang holds its rendezvous.

(G) Several patrol seaplanes and one cable ship for duty in the Communication Division.

Thus the distinction of being one of the largest users of Diesel power of any branch of the U. S. Government belongs to the Coast Guard Service. During the past three years this fleet of forty-six 100 and 125-foot Diesel-driven patrol ships of special design have been put in commission on the Atlantic Coast for special duty in tightening the blockade against liquor running craft. When the Coast Guard was assigned the task of keeping these outlawed vessels from landing rum cargoes on our shores, there arose a serious need of a special type of economically operated patrol ships, capable of service inshore or offshore in any kind of weather, and with long crusing radius for trailing the contraband-laden ships. The last batch of these patrol ships of the new design was put into commission in 1927, and since that time they have succeeded in establishing for themselves a record of operation that may be well observed by owners of every type of small vessel.



75- and 125-footers at the Staten Island base

In addition to this large fleet, the Coast Guard operates four other oil-engined ships of small design, and only last Spring put into commission a 1200 hp. Diesel-electric vessel of

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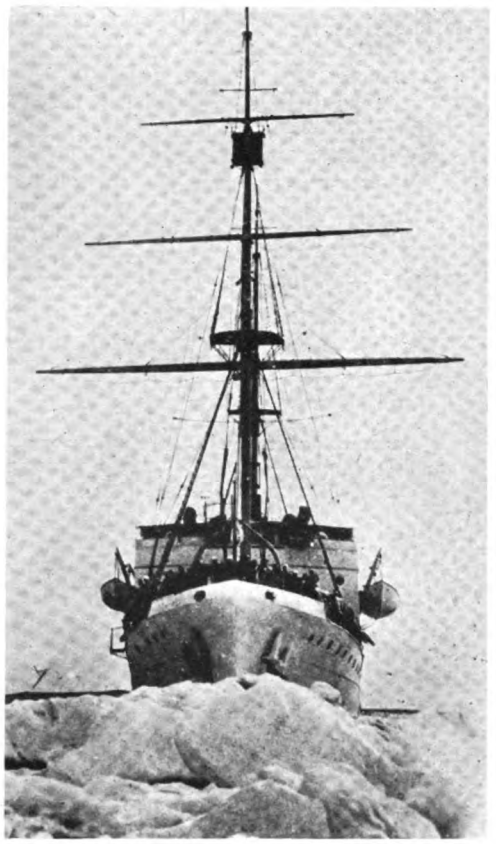
special construction for north Pacific and Arctic ice patrol. This ship, the NORTHLAND—it will be recalled—replaced the famous BEAR, which for a half century patrolled the northern seas as a representative of the long arm of our Government. She must stand—as did her staunch predecessor—severe punishment in the shifting ice floes of the Behring sea.

For the purpose of observing firsthand the running and characteristics of a typical unit of the fleet of 46 Diesel-driven patrol boats, a member of the editorial staff of MOTORSHIP was permitted to go aboard one of the 125-footers operating from the New York base, for a ten days' sea trip. Fortune favored this trip, as an interesting series of events occurred that revealed the operation of these vessels to their best advantage.

In order to give the reader a background for the activities of the Coast Guard, it is well to digress here and briefly trace its history. Back in 1790, over 138 years ago, the United States Coast Guard had its inception as the first organized patrol of America's extensive coastline. For many years this was the only marine branch of our Government, superceding the navy by several years. Primarily organized to suppress smuggling the Coast Guard has grown from a small force of men with a few ships to one of the most effective branches of this or any other Government, and today maintains a fleet of 484 steam and motor-powered ships with a tonnage in excess of 80,000 tons gross. The combined shore and ship personnel numbers well over 11,000 men, and 12,000 tons of this patrol fleet are fine modern motor vessels—regular motor police of the high seas. For over 7,000 miles, from Point Barrow in the Alaskan Arctic ocean to California on the Pacific, and from the Bay of Fundy to Texas on the Atlantic Coast—as well as the entire Great Lakes shoreline—the Coast Guard maintains what may be considered the most effective patrol system ever placed around any country. Truly they are workboats!

This patrol consists of two parts. First, there is the shore patrol embracing the Coast Guard men who maintain their lonely beats along the shoreline, ever alert to aid shipping, fishermen and bathers, and on watch for marine disasters. This division maintains a complete shore telegraph system that encircles the entire country, and during time of war can warn the rest of the country of the approach of an enemy. Every coast radio and radio-beacon station is linked with this system, thus placing America in a leading place among the countries of the world in assistance of its coastwise shipping. The second patrol is the offshore system, at one time known as the Revenue Cutter Service, whose duties were to enforce the Revenue laws regarding the landing of contraband goods. In 1915 both services were merged into one unit, with sole charge of protecting our coastline and rendering assistance to shipping.



Diesel-electric cutter Northland crashing through the ice

The one great service which the world's shipping in general owes much to is the famous North Atlantic Ice Patrol, inaugurated in 1913 after the great White Star Liner TITANTIC sank with a loss of 1,500 lives, a few minutes after striking an iceberg.

For an actual survey of the Coast Guard in action, go down on the Coast Guard pier at Stapleton, Staten Island, New York City, which is the most important of the seven main operating headquarters of the service. Here under the command of Captain A. J. Henderson, the most densely populated area in the world is given the most extensive Coast Guard protection ever organized. From all appearances it is a naval station, with its uniformed sailors and trim gray ships.

It was late in the morning when we arrived. Lieut. Hall, in charge of the eleven Diesel ships in this division, had issued orders to the patrol ship CUYAHOGA to proceed to sea on a regular five-day patrol. Along the sides of the pier were the 125 footers and the 75 footers. In this completely motorized fleet no smoke or water-stretched steam pipes marred the traditional spotlessness of these craft. Though it was only three minutes before sailing time, the engineer was minutely inspecting a brass rail for a trace of dirt. It looked as if we weren't going to sail! At the last minute a messenger rushed up with orders to proceed to our patrol area, an oblong stretch of water off shore. Everything was in readiness for departure. There was neither hustle nor bustle amongst the crew who looked upon this trip as merely a continuation of prosaic work. Our departure was matter of fact and Navy-like. The engineroom telegraph bell sounded. By this time the engineer was on the main deck fixing a pipe. But with 58 seconds elapsed after the bell rang, the twin-screw Winton Diesels were in full speed reverse! The ship was under way and nobody lost any time steaming up or fixing spark plugs, the decks and engine room were free of soot and coal dust and the engine room trimmings are shipshape.

What a contrast to the older coal-burning cutters, with their operating crew of six men per watch. For hours the steam would have been up and much fuel wasted. Diesel boats like the CUYAHOGA with but one man on watch, or a one-sixth reduction in engine-room crew, accomplish exactly the same type of duty but have a far greater cruising radius—due to their much lower fuel consumption.

Quickly after the pull out of the pier, we were headed down the bay with the engines running at full speed. Five high-pressure air bottles on these ships provide ample air for quick maneuvering, and a large motor-driven two-stage compressor can be coupled in and run off the storage battery set in case the air runs low.

These vessels—described in MOTORSHIP in April, 1927—are of a modified cruiser design and have trim lines, plenty of beam and well designed underbody to withstand the roughest weather. Their Winton Diesels are of the six-cylinder four-cycle air injection type and develop 150 s.hp. each at 450 r.p.m. They are placed amidships in the center watertight compartment. There are five watertight compartments in the ship, and all doors, hatches and portholes have rubber insulated steel doors, which may be locked shut, thus making the ship practically leakproof.

They are heavily built of steel and well laid out for long duty at sea, having a large forecastle forward with accommodations for 16 men. Their loaded displacement is 220 tons. On account of the depth of the hull, large space is available under the forecastle floor for use as an ammunition locker. An extensive storage space and chain locker is located in the forepeak. Three single-berth staterooms for officers and engineer. well fitted out, are on the

Photo, International News Reel

A fleet of the 75-foot gasolene-driven patrol boats

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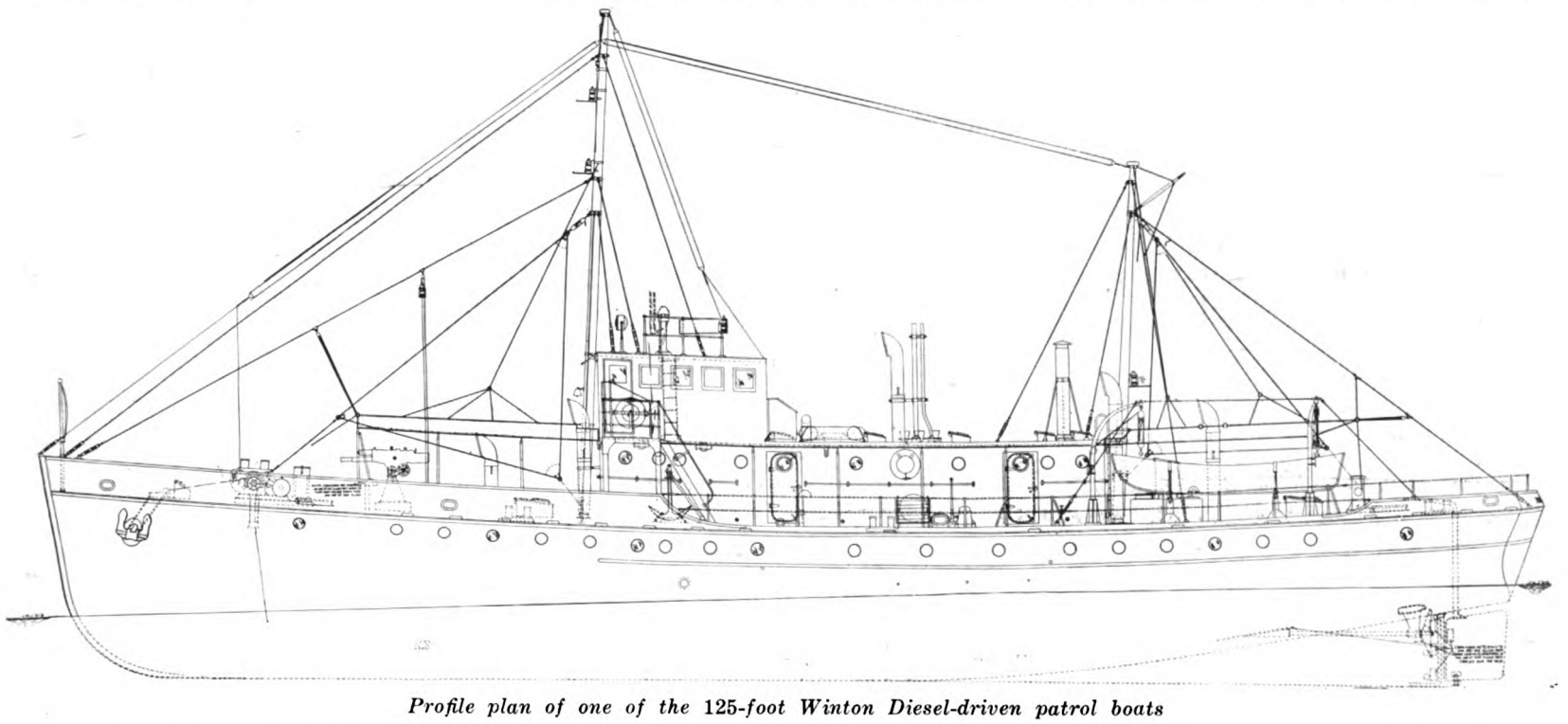
aft starboardside of the forecastle, which brings the accommodations forward to 19 men and officers.

Just aft of the engine-room is a large fuel tank located across the entire width of the ship, having a capacity of 6650 gallons, or enough for 4000 miles cruising radius. In the next compartment aft is a completely appointed ward room and galley on the starboard and port side respectively, with a heating plant, coal bunker and a 1500 gallon water tank between. Next aft is the crew's mess, with large stores in the after compartment. Accommodations for four extra men are available in the ward room, crew's mess and pilot house. Ordnance lockers and washrooms are located in the cabin. The lubricating oil tanks, fire-fighting equipment, whistle compressor and mufflers are arranged in the upper part of the engine room, the two level arrangement providing admirably well-laid out, roomy quarters for operation. The combined chart room, radio house and pilot house with small wing bridges are on the forward top end of the main cabin. A four-inch gun is mounted on the forward deck as well as an electric winch for hoisting anchor. The 100-footers are of the same general design.



Profile plan of one of the 125*-foot Winton Diesel-driven patrol boats*

These ships are entirely electrified throughout, having a 12 hp. two-cylinder Hill Diesel driving an 8 kw. Engberg generator. This set charges a sixteen-cell 32 volt, Philco storage battery of 200 amp. hrs. capacity which operates the radio, Frigidaire ice plant, Leyland whistle compressor, searchlight, ship's lights, auxiliary air compressor, sanitary fuel and water pumps, and in an emergency operates the 7½ hp. fire pump for one hour, or the 7½ hp. Electro Dynamic motor on the Hyde windlass. The ships are equipped with a forced draft, electrically-driven, ventilator, which is also run off the battery. The Lux-Rich fire extinguishing system is fitted to protect the ship and crew.

As we headed out to sea aboard the CUYAHOGA, the engines were crowded up to their limit in order to reach the patrol area out in the open sea by nightfall. The battery set had been charged the night before. Once under way, the engines performed beautifully. After they are once warmed up, the fuel is cut down, simultaneously increasing the pressure of injection air. On engines of this size and speed it may seem unnecessary to use the air injection principle, but during the past year and a half practically no trouble has been experienced with carbon deposits and plugged fuel nozzles. All engines of this type, the Coast Guard operating 92, are equipped with a specially designed reverse gear that formerly drew its lubricating oil from a by-pass in the engine lubricating supply. But, owing to difficulties of keeping the return oil from the reverse gear free from particles of metal, a plate was inserted between the gear box and the crankcase, thus dividing the engine. The case is filled with a special heavy oil that will sustain a continuous reverse run of an hour's duration without heating. Formerly considerable trouble was caused by the metallic particles in the oil, a fine screen and even a magnetic separator not even keeping the line free of oil.

In this connection it is well to point out that the successful operation of oil centrifuges on many types of Diesel-driven ships has led Lieut. Hall to consider the installation of a small one in the CAHOONE, a sister ship of the CUYAHOGA, to eliminate minor lubrication troubles. This installation will be made shortly, and its operation will be carefully studied by all operating engineers in the Coast Guard with a view to applying them in other units of the Diesel patrol fleet. Already some of the gasoline-powered divisions have shore De Laval centrifuge stations that have proved their worth in purifying lubricating oils.

From the time the first cylinder fired when pulling out of the base pier at Staten Island, the exhaust on the CUYAHOGA was clear and steady. Even at the high engine speeds maintained during the first day out there was no vibration aboard ship.

The first real test of these ships came on the first night out. Toward evening of the first day we approached our furthest south position and headed East into the coast steamer lane. Just after sunset we struck a heavy fog which rolled in from the Gulf Stream and blotted out everything. This necessitated reducing the speed to about six knots. Owing to the great number of ships using this North and South track, it was necessary to stop frequently to listen for approaching craft.

It is customary to charge the batteries during the night, as the little Diesel generating set is busy during the day running the bilge pump, which is also used to supply water for cleaning decks as well as pumping the five bilges. Owing to the necessity of absolute silence at frequent intervals, it was decided to dispense with the "put-put" of the generating set, and rely wholly on the charge of the previous night, and the engine-driven compressors to provide injection and starting air. The whistle was busy most of the night, and the three men on watch had their hands full alternately listening for a muffled whistle somewhere out in the blackness and ringing for half speed ahead. This process was repeated at frequent intervals.

There is limited air storage available in the five small bottles. The starting air is maintained at around 1,000 lbs. per square inch, the same pressure as the injection air. The three-stage attached air compressor soon brings the pressure up after the engines are started. On these comparatively small engines, 800-1,000 lbs. pressure gives them a quick start as stated. The average time for maneuvering was not greater than 20 seconds, or about the same as steam. Several times during the night only one engine was used to maintain our cruising speed. Occasionally we saw large passenger steamers, which like small spectral cities, suddenly appeared and as suddenly disappeared in the night. There was no mystery shrouding their movement.

By noon of the second day the fog had lifted and for the next two days a steady run over the patrol area was maintained at full speed. A slight fog came up on the second night. During the first three days most of the crew was painting

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holystoning decks and scouring up the ship in general. The bilge-service pump, supplying water for this purpose, driven by a 7½ hp. motor, was used during most of the day, the Diesel generating set being run most of the time. The engineers claim that the generating set gets the most severe treatment of anything aboard ship. "Just start her up and let her run, is about the only operating troubles we have," is the engineer's way of putting it. "Sometimes she gets cranky and has to be primed with a shot of kerosene and given *eight* turns instead of *three* or *four*, but during the past two years we have never had to fuss much with her."

The morning of June 15, the third day out, dawned clear and warm. Just after dinner at noon, most of the crew and the skipper were enjoying a siesta on deck. Sundry pants and shirts were drying on the two dories stored aft, the men basking in the sun in their "Skibbys," the nautical term for B. V. D.'s. The skipper was draped over the canvas covered windlass on the forward deck, also enjoying a half hour's rest in the sun. Even the cook and the Porto Rican mess boy had stopped their endless round of serving "chow" and were examining a rather uncertain fish line with a view to catching some Spanish mackerel for supper. "Sparks," the radio

The Emme Helene of St. Pierre runs up the French flag

operator, has just reported good weather for the next day or two and the engine-room was polished up to suit the fussy taste of the skipper, as well as of the engineer—the six foot czar of the machinery. Truly a shore-bred man would think that this must be a happy life.

Somebody casually mentioned that it would be just their blankety-blank luck to pick up a "Rummie" and then the five-day patrol might stretch into a month. Another, not quite so casually, mentioned that it would be a good time to drown the author of that wise-crack. Memories of the last "Rummie" the CUYAHOGA overhauled passed in review—how they trailed a wallowing foreign flagship for 18 days in a rough sea, with the engines running at half speed and fresh food supplies gone. On this particular trip the CUYAHOGA ran clear to Bermuda, chasing this ship out of American waters, and out of range of the fast shore fleet that would soon have made quick work of running the cargo.

Suddenly there came a crisp announcement from the bridge—"There's a ship off to the right—looks like she carries black sails! Shall I head over that way, sir?"

The "Old Man" peered through his field glasses from his perch in the bow and after a minute's perusal,——

The Cuyahoga cruising alongside her quarry, the Emme Helene, sixty miles offshore

"Overhaul her and tell 'Sparks' to stand by." A clang below decks and all extra speed possible was crowded out of her. Preparations were made to board the ship and examine her papers. Immediate action marked the next few moments. Interest of all hands was centered upon this apparently aimless wanderer of the seas. The Gunner's Mate eyed the ordnance with meticulous care and the machine gun was assembled. The dories, but a few minutes before serving as clothes lines, were swung out ready to lower away.

Within a few minutes, definite outlines of a black sailed catboat took shape on the southern horizon, and a few minutes more we crossed her bow. Just as the signal for reversing was given, a grizzled man ran up the French flag on our quarry. A side view showed her name plate reading EMME HELENE OF ST. PIERRE. St. Pierre Miquelon Islands! This obviously meant a 1,600 mile chase to the end of Newfoundland. Since she hoisted French colors, and was well outside the twelve-mile limit, there was nothing to do but to keep watch until she reached her home port, or violated the U. S. law by either getting inside the limit or discharging cargo.

Orders were issued to conserve water and go easy on the food. It may be a month or two before land is seen again.

"Sparks" buzzed out to the commander on shore "GNDL" calling, CUYAHOGA, picked up French auxiliary schooner EMME HELENE OF ST. PIERRE, in Latitude 39-30 N and Longitude 73-50 W 12:50 P. M. and is now standing by." The Coast Guard is in operation. A warning sent out by the destroyer cruising far out on the outer layer of patrol ships was right. There was what appeared to be a contraband-laden schooner in the vicinity.

About ten minutes after we overtook the EMME HELENE, a large blue and yellow winged monoplane approached from the Northwest, and circled very low near us. She had large sidelights and a roomy pontoon and was identified from the record of being a Rummie plane. Evidently we had just arrived in time to prevent the plane from landing and taking a load back to shore. Upon sighting the CUYAHOGA she roared back toward Atlantic City.

The prompt decision of the plane to turn tale and run at the first sight of a chaser indicates that the rum runners have a great respect for the Coast Guard. We agree that descretion was the better part of valor in this instance and that there was no choice as far as the plane was concerned. It appeared to be of less moment to the crew of the CUYAHOGA than to the writer. In the first place the daring of the plane, proceding out to sea to pick up contraband, would lead one to believe that some form of strategy would be employed to outwit the opposition. Perhaps the fertile minds of the rum running fraternity are planning something of the sort. To us it appeared to be a complete victory and—putting the question of prohibition entirely to one side—unlike the men in uniform we were inclined to feel just a little chesty about it.

All day we lay beside the EMME HELENE, and judging from the clanks and growls below decks, the internal-combustion engine she carried as auxiliary to her sails, was out of commission. At night, we ran elliptic circles around her, and making about four knots. Despite the fact that a high-speed Diesel does not usually run very smoothly at greatly reduced speed for long periods, the starboard one, ran unusually smooth at 200 r.p.m. This circling was necessary to prevent speedboats and planes from landing near her and taking a load ashore. From the log or record kept of all the contraband or believed contraband ships, the data for which is obtained by the Government's secret service as well as the clearance records from foreign ports, a captain has before him all the information necessary and so knows what each ship is like. Their average speed is about 11 knots and most of them are sail with auxiliary at engine.

For the next two days we had to main-

Coast Guard destroyer-type patrol, Davis, "looks over" the Cuyahoga's quarry

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tain our vigil at trailing her by day (keeping up with the wind drift) and circling her at night. For more than thirty-six hours it was necessary to run one and two engines at below half speed, yet their performance was smooth and clean. On June 17 at midnight, a gasolene-driven 75-footer reported for picket duty, enabling us to take it easy at night, the smaller ship doing the circling. The extra patrol became necessary as we were not very far off Atlantic City, and speedboats might be expected at any time. Excitement grew tense as we anticipated the EMME HELENE might cross the twelve mile limit at any moment. By this time her crew appeared to be intoxicated, and we feared that they could not navigate properly, they once having nearly rammed us in a breeze. On the following morning a Coast Guard plane came out to see what was going on and the steam cutter ACUSHNET also approached.

All day, June 18, a high wind made it necessary to trail the EMME HELENE at about three miles per hour with one engine at half speed. The following day things happened fast. About 2:30 in the afternoon we heard a loud poppety-pop-pop of the engine. Suddenly the schooner started off Northeasterly at full speed. From quarter speed with one engine to extra full speed with two, we soon overtook her and trailed along in the direction of St. Pierre at nine knots. During all this erratic maneuvering, the engine cooling-water temperatures seldom varied a degree. Just after sunset on June 19 a light fog steamed up from the ocean, gradually increasing to a moderately heavy blanket. About that time the schooner slackened speed to about two miles per hour. Owing to the possibility of losing him in the streaks of fog, it was necessary to idle the engines at three quarters speed and throw in the clutch occasionally to catch up to him. No harder work can be thrust on an engine. But throughout the whole series of maneuvers the governors held the power in check and little uneven running was noted.

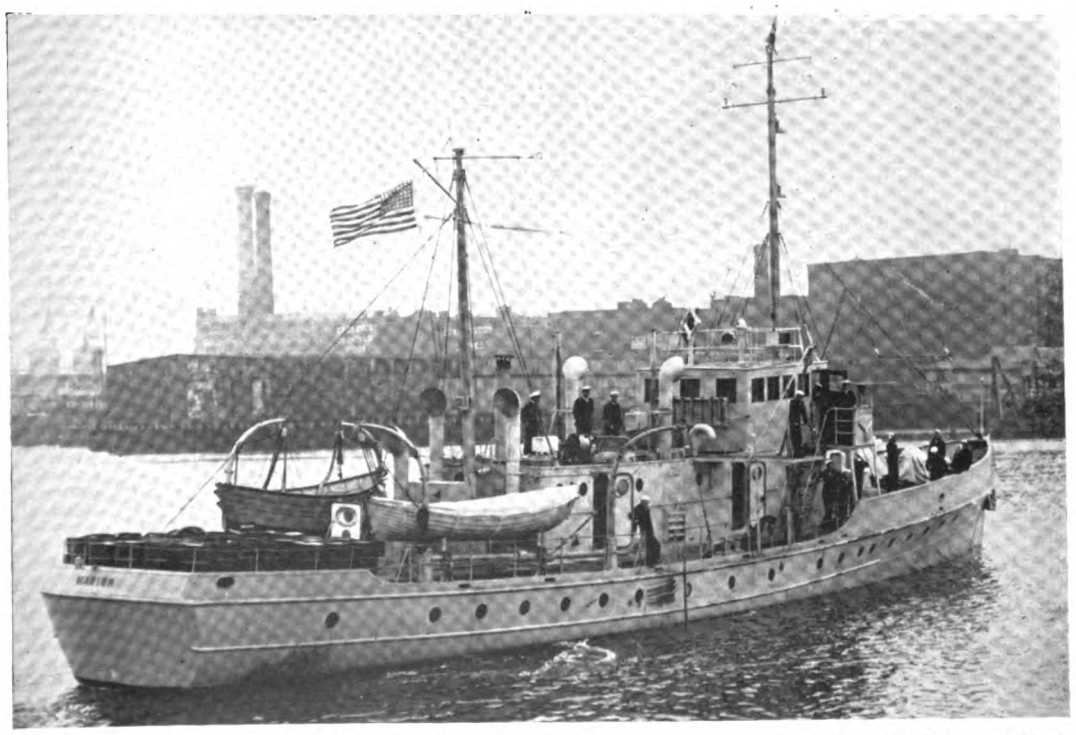
The crew and officers of the Cuyahoga, taken while on offshore patrol duty, O. Rahle. Boatswain in charge. Reading from left to right: M.E. Hoffergert, H. Simminger, R. F. Yost, L. Bucker, Wm. Ross, A. Bass, W. Wisikowski, L. B. Harris, D. Mellott, T. E. Danley, E. A. Simpson, Boatswain, and Mr. Rahle

By midnight the fog became so thick that we were in danger of ramming the EMME HELENE, so it was necessary to slacken our pace still further. At one-thirty the following morning our quarry suddenly extinguished all her lights and disappeared into the fog. For the next two days we covered the entire patrol area many times at full speed endeavoring to pick up the schooner once more, but without avail. June 20-21 we ran through a heavy Northwest gale that lifted the propellers clear of water many times each hour. For a second at each rise a slight tremor would pass through the ship as the speed increased, but as the governor quickly took hold and the propellors dropped back to their regular speed, the tachometer registering only a few points faster. On June 22 the CUYAHOGA was relieved by another patrolman of the sea, the BOUTWELL, and a full speed run of four hours brought us back to the New York base, after an excellent and average test of one of the Diesel installations.

We hail a New England schooner to examine her papers

From the following analyses of the operating characteristics of the various types of Coast Guard ships and the actual observed conditions aboard the CUYAHOGA, as a representative member of the fleet of 46 Diesel patrol ships, it is plain that the use of the Diesel engine in this type of work is just in its infancy. With the development of the high-speed light weight oil engine, together with refinements of operation and design of types of engines suitable for heavier craft, there is no reason to doubt the belief that the future Coast Guard vessels will be Diesel driven. The 75-footers, the cutters, the patrol ships and the smaller craft are all prospective users of some type of Diesel. In fact we believe that it was only a form of "engineering nervousness" that prevented the cutters now building from being Diesel-electric, instead of turbo-electric.

The all Diesel auxiliary arrangement of the 100 and 125-footers are making a splendid showing and have proved their worth on this unusual service. When a 220-ton ship averaging 22,000 miles per year can operate for about half as much per mile as a 37-ton gasolene ship, no voluminous comment or discussion is necessary to demonstrate which type of power is the most efficient. There is little doubt in the minds of practical men as to the advisability of choosing this modern and efficient form of power for vessels of this type.



The Winton Diesel patrol boat Marion, selected to study oceanographic and ice conditions in the Arctic this Summer

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this type. Another factor to consider is that several changes had to be made in these Diesel ships during their first year of operation as the result of service, experience, and this is included in the cost per mile. Next year they will have an even better tale to tell.

In the case of the 100-foot Diesel-driven boats, the average operating figures over a twelve-month period for thirteen vessels is as follows:

100-*Footers—One Year's Service*

Distance cruised.....12,178 nautical miles
Average speed.....8 knots
Fuel Oil Consumed.....20,768 gals.
Cost of Fuel Oil.....$1,539.63
Galley and Heating Coal Burned...25 tons
Cost of Coal.....$338.56
Lubricating Oil Used.....1,163 gals.
Kerosene used.....508 gals.
Cost of Lub. Oil and Kerosene....$634.71
Cost of Fresh Water.....$4.84
Cost of Repairs.....$930.10
Total Operating Cost per Mile.....$0.31
Fuel-Oil Used.....33 degs. Beaumé

For the 125 ft. boats, we have taken an average of 33 vessels also over a period of twelve months:

125-*Footers—One Year's Service*

Distance cruised.....4,959 nautical miles
Average speed.....7.21 knots
Fuel Oil Consumed.....12,167 gals.
Cost of Fuel Oil.....$797.09
Galley and Heating Coal Burned...14 tons
Cost of Coal.....$188.91
Lubricating Oil Used.....352 gals.
Kerosene Used.....101 gals.
Cost of Lub. Oil and Kerosene....$175.60
*Cost of Fresh Water.....$1.91

The Boutwell coming alongside to relieve us from duty after ten days at sea

Cost of Repairs.....$53.56
Total Operating Cost per Mile.....$0.261
Fuel Oil Used.....33 degs. Beaumé
Initial cost of boats and machinery .....$33,000 each

*Average of 14 boats only; no record of balance.

It would seem from the above that these vessels have been very efficiently operated. Both the operating and maintenance cost may be regarded as being very good indeed. The repair cost of the 100-footers is higher than that of the 125-footers, due to the fact that the Diesel engines in the smaller boats were the first of their type. Much valuable knowledge was gained after the first period of operation, and all the accrued knowledge was incorporated into the design of the second batch of engines in the thirty-three larger craft. This is a natural sequence of events.

It is not possible at this time to give operating figures on the 1200 b.hp. McIntosh & Seymour Diesel-electric cutter NORTHLAND, as compared with the new turbo-electric cutters, but the total operating cost of the first 1⅞ months of the NORTHLAND was $8,920, including nearly $1,000 for the coal required for heating and cooking, and including bunkers for a long trip.

Each year finds the duties of the Coast Guard becoming more numerous, and each year the actual saving to shipping grows. During 1927 nearly $38,000,000 in shipping tonnage was saved from destruction, yet it cost only $22,000,000 to maintain the service—the most extensive in the world. Actual lives saved amounted to 3,313, a value unquestionable in dollars; but the Government war-time value of $10,000 each would make this service worth $33,000,000. Nearly 69,000 vessels were boarded and papers examined, a service whose value is beyond estimation. Countless other services were rendered, and none was less important than the services of the 486 ships. It is indeed fitting that the MARION, a sister ship of the CUYAHOGA, was chosen to carry Lieut. Edward H. Smith into the North Atlantic and Arctic this summer to spend two months studying the weather, oceanographic and ice conditions, as the first expedition of this nature ever undertaken. The ship was due to leave Halifax on the 20th of July, and will be solely dependent on her Diesel equipment.

By its own merits the Diesel is finding a place in this great service, and with the unlimited oil reserves now held by the Government, it should be the sole means of propelling the future Coast Guard fleet.

Small River Tug Now Available in Stock Size

IT is apparent that a stock boat may be better than one produced to order. If there is no sound reason for producing a custom built job, advantage may be taken of precedent, and refinements may be added as the result of experience gained in earlier construction. But, the boat in actual service will tell the tale in a more understandable way. Since we have the history of one of these little craft it is perhaps just as well to tell what she has accomplished.

She is 64 ft. 9 in. in length, 18 ft. beam and 45 in. moulded depth. The main propelling unit is a 100 horsepower Fairbanks-Morse Diesel engine with paddle-wheel direct drive. She is trim in appearance with sheer fore and aft, and a cabin extending from end to end in which is provided ample accommodation for her crew of two men. The workmanship is high grade. Riveting, chipping and caulking is used throughout. Tanks are built-in and the cabin is of steel. She is in fact a distinct advance over the old type of boats built of wood.

She is the CRITERION built by the Charles Ward Engineering Works at Charleston, W. Va., to their own account for stock. She was sold to a private owner who took her to Pittsburgh where he obtained a charter. With three 500-ton barges fully loaded the CRITERION proceeded from Pittsburgh to St. Marys, a distance of 160 statute miles, at an average speed of three miles per hour. The operator is his own pilot and he has one man with him. The cost of fuel is 45½c per hour, and the cost of lubricating oil while not accurately determined should amount to about 5c per hour. The price of this boat is $24,000, which forms a definite basis for calculation of the capital investment for the operator contemplating the construction or purchase of a new vessel of this kind. It is apparent without involving extensive calculation that she will yield a fair profit to the operator who charters her at a rate of $4.00 per hour, or $40 per ten hour day. It is also apparent that the charterer finds himself in a position to move cargo at a very reasonable rate or at an exceptionally good profit.

The following actual tests were made with the boat without a tow; also with a partly loaded and a fully loaded barge, representing 250 tons and 400 tons respectively:

Load	Speed in Still Water Miles per hour
Light boat	9.5
Partly loaded barge	5.5
Loaded barge	5.0

Thus it is apparent that to operate this tug, towing a barge carrying cargo, comparable in weight to the amount carried by a small river steamboat, the speed differential is not so great as in the case of transporting 1500 tons of cargo on three barges. These are operating problems gradually being solved by shipping men. In all events the figures herewith set forth reveal vast possibilities for the extended use of Diesel rivertugs of this kind.

Pushing ability of this boat is known. Her selling price is established. She is specially designed for river service

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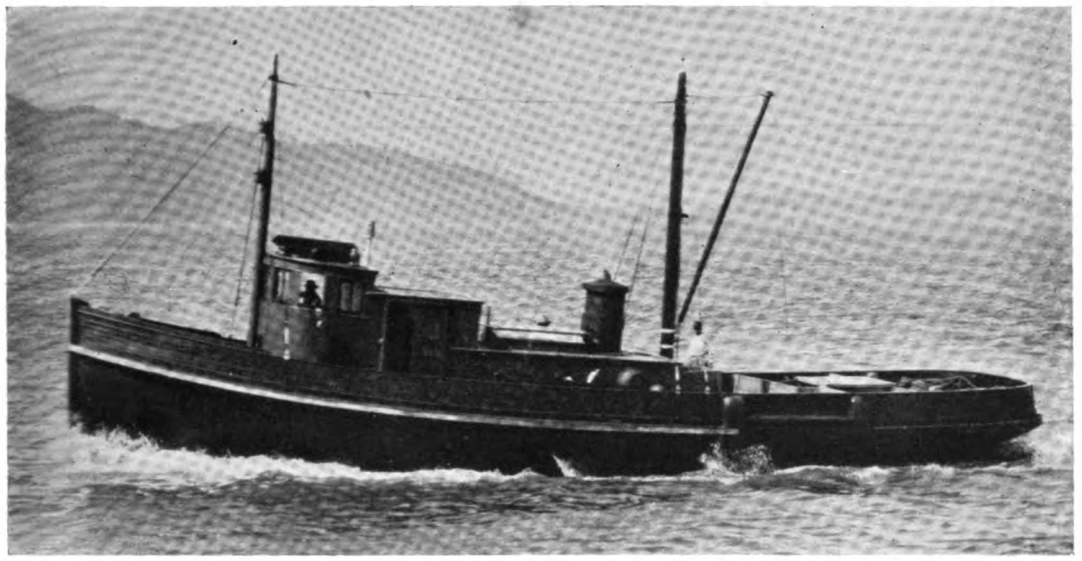
Two Speedy Little San Francisco Trawlers

THE residents of San Francisco, California, will be indebted to a pair of small Diesel powered trawlers for a portion of their daily supply of fresh fish. Two of these boats, identically the same in every respect, were recently completed at the yards of Madden and Lewis, Sausilito, to the account of the Martinelli Fish Co. Their principal dimensions are length 65 ft. beam 16 ft. 8 in., and moulded depth 8 ft. which makes for good seaworthiness.



One of twin, fast San Francisco trawlers recently completed for the Martinelli Fish Co. Clean cut lines permit good speed with little fuss

Each boat is powered with a three-cylinder 135 b.hp. Washington Estep Diesel engine, giving them a speed of 12 knots, exceeding even the expectation of the owners and builders.

Leaving San Francisco at two a.m. each day the two boats proceed to the fishing banks where they work together. A weighted net is towed between them, while they stand apart a distance of several hundred yards. As they tow the net the engines are throttled down to about 100 r.p.m. and so moving slowly they make their catch, which consists principally of sole. At about six or seven in the evening they head for port and the fish are sold on the San Francisco market the following day.

The boats are sturdy little craft, built of wood. They have a good sheer forward which contributes to their seaworthiness. The stern is low, broad and unobstructed which gives ample space for the crew to work. Two masts carry the running lights. The main-mast is rigged with a boom which is a special requirement of this class of fishing vessel. A power-gipsy lightens the work of the crew. The boats are well planned and constructed and constitute a worthy addition to a growing fleet of Pacific Coast fishing vessels distributed from the Behring Sea to the coast of Mexico.

New Engine for Workboats and Yachts

A NEW type of small four-cycle Diesel engine, intended for yachts and workboats, has been produced by the Standard Motor Construction Co. of Jersey City, N. J. It is rated at 40-60 horsepower, the latter at 600 r.p.m. That it is capable of delivering its rated power was demonstrated when it actually delivered 75 horsepower at 600 r.p.m. on a fuel consumption of 0.55 lb. per b.hp. hr. on an overload run.

Of considerable interest is the fact that these engines, with a bore of 6 in. and stroke of 8 in. operate satisfactorily on fuel as heavy as 24° Bé. The manufacturers state that the four-cycle principle and very fine atomization of the fuel are responsible for perfect combustion. Three fuel pumps are employed. They are mounted directly over the gear housing and operate in parallel. One of them is sufficient to supply fuel in case of emergency.

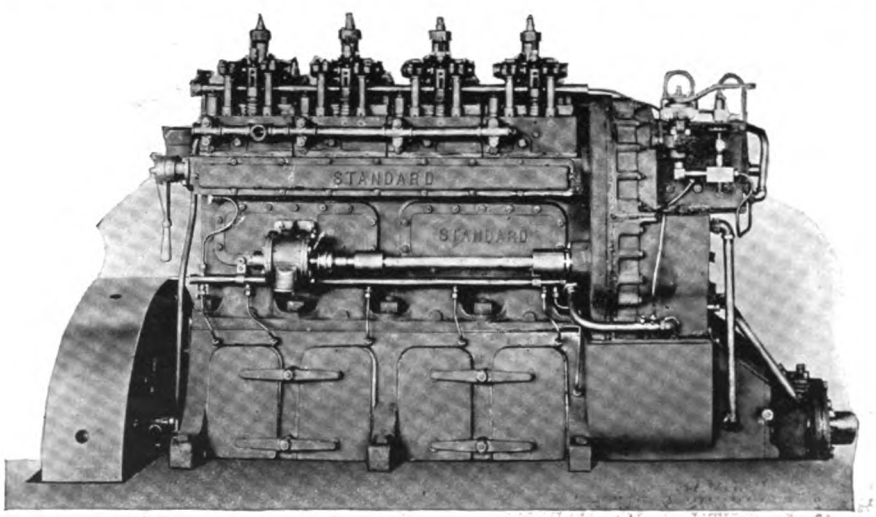
No form of pre-combustion space is employed, fuel being sprayed directly into the combustion chamber proper. Fuel reaches the atomizers under sufficient pressure to bring about complete atomization. It is passed through fine strainers before reaching the small orifices in the spray nozzles. Timing is such as to start injection at the precise moment desired. Fuel in excess of that required for combustion is returned to the fuel tanks by means of a special arrangement of drains.

Starting is accomplished by means of compressed air, under control of a small lever mounted on the forward end of the engine. A small air compressor attached to the engine maintains pressure on the starting tank. It is said that comparatively low pressure air is required for starting, and that a single movement of the starting lever is all that is required of the operator to make a quick start.

Two inlet and two exhaust valves are grouped around the spray noozle located in about the centre of the cylinder head. The latter is rectangular in shape and easily removable. Equal distribution of heat stresses results from absence of appendages and irregular masses of metal, thus giving a uniform shape and providing a simple form of casting. The valves in the head are operated by rocker arms and push rods. Movement is transmitted to the latter by means of cams mounted on a camshaft driven by a Link-Belt silent chain housed in a casing immediately aft of number four cylinder. This same chain drives the pumps, one of which is of the rotary type for pumping circulating water. Double pumps supply pressure lubrication to all bearings and other parts requiring lubrication.

The main bearings are extra long. They are supported, between each crank throw, with rigid cross-webs in the base, between the cylinders. The bearings, centrifugally poured, are babbitt. Four-cylinder en-bloc casting is securely tied to the engine frame with large diameter bolts. On the sides of the cylinders casting are cover plates, each spanning two cylinders and providing access to the jacket space. Additional covers are provided in the lower base opposite each crank. Their removal permits access to the main bearings and crankshaft. The valve mechanism is also covered; but the covers were removed when the engine was photographed.

The chrome vanadium crankshaft of large diameter provides strength in excess of ordinary service requirements. On the forward end of it is mounted a heavy flywheel and governor. On the aft end there is a Joe's reverse gear housed in the base. A Timken roller thrust is used. The pistons have extra long skirts to reduce side thrust on the cylinder walls. Connecting rods in I beam section are heavy.



The new 40-60 horsepower Standard Diesel engine

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Among Pacific Coast Workboats

By H. H. Dunn

A 120 ft. fishing boat is building at the Al Larson Boat Yards, San Pedro, for Sakamota and Seki. The main engine will be 450 hp. and the auxiliary engine 45 hp., both Western Enterprise Diesels.

Peter Rast of San Diego, Cal., is building to the account of Frank Silva, of the same city, a 116 ft. craft, for service not yet announced. A 350 hp. main engine and 30 hp. auxiliary engine are both Western Enterprise Diesels.

Building at Nunas Brothers yard in Sausalito, Cal., is a new fishing boat, length 120 ft. and beam 23½ ft. in which will be installed a 450 hp. Western Enterprise Diesel main propelling unit and a 30 hp. engine of the same make for operation of the auxiliary equipment.

An interesting motorcraft built by Anderson & Cristofani and now in service on the sloughs and other shallow waters around Petaluma and on the upper end of San Francisco Bay, is the 50 ft. twin-screw tug, DOROTHY BADGER, and powered with two 65 hp. Atlas-Imperial Diesels.

William Cryer & Sons, Oakland, Calif., builders, have under way a 65 ft. x 18 ft. x 7 ft. x 5 ft. trawling boat for the Western California Fish Company, to carry a 165 s.hp., four-cylinder, Atlas-Imperial Diesel engine, from which is expected to give her a speed of 11.5 to 12 knots.

Lumber companies are building, or have built, a number of Diesel-equipped towboats, as well as dispatch and hospital craft, so far this year. One of the latest is NORA JANE, 75 ft. long, driven by a 120 hp., Fairbanks-Morse Diesel, recently delivered to the Kelly Logging Company, on Puget Sound.

From Tacoma comes word that the 85 ft. tug, CAPTAIN O. G. OLSON, built by Mojean & Ericson, of that city, and powered with a 250 hp. Fairbanks-Morse direct-reversible Diesel, exceeded her contract speed on her trials, having run for a considerable time at 11 knots.

It is not often that separate owners order sister ships, but the Harbor Boat Building Company, Terminal Island, Calif., has completed two combination fish-tenders and towboats, each 80 ft. long, each equipped with a 210 hp. Fairbanks-Morse Diesel and each costing $35,000. One is for A. Ryono and the other for Mat Zorich. The former will be christened PACIFIC, and the latter PATRIOTIC.

An addition to the towing fleet on the Pacific, outside as well as in the harbors, is CROWLEY NO. 23, just completed by the Crowley Launch & Tug Co., of San Francisco and Oakland, at its own yard in the latter city. This tug, 75 ft. long, is driven by a 200 s.hp. Pacific-Werkspoor Diesel, and is to be used largely for towing between the Hawaiian Islands and the Golden Gate.

Two 110 ft. x 25 ft. x 11 ft. bait boats are under construction at the yards of Al Larson, in East San Pedro, southern California. One of these, for order of Seki & Sakamoto, Japanese fishermen, will be driven by a 375 hp. Western-Enterprise Diesel; the other, for Santos & Sousa, is to have a 360 hp. Fairbanks-Morse Diesel. Each one of these large fishing boats will be cork-insulated, equipped with electric refrigerating and auxiliary machinery, large bait wells and fish tanks, and will have a cruising radius of between 5,500 and 6,000 miles.

At San Diego, also, three 114 ft. x 25 ft. x 7 ft. tuna fishing boats are well under way in the Campbell Machine Company's yard. They are virtually sister ships, except one, for J. C. & Matthew Monise will have a 350 hp. *seven*-cylinder, Union Diesel, with a 24 hp. Union Diesel for auxiliary power, while a Fordson gasoline engine will provide current for emergency or overhaul work. These smaller engines can be direct connected to the line-shaft, by which air-compressor, generators and cargo winches can be operated. A 5 in. x 5 in. York refrigerator and two five-inch De Laval centrifugal pumps complete the equipment. Of the other two of this trio of large tuna boats, one is for Manuel Silvera & Son, and the other for John Cardosa. They are equipped alike, with 300 hp. six-cylinder Union Diesels.

Two interesting combined towing and passenger carrying boats recently put into service are SEAKIST, built for P. E. Harris & Co., by the Olsen & Sunde yard at Seattle, and ROBERT A., built by the Bellingham, Wash., Marine Ways, for the Bellingham Canning Company. Both are to be used as workboats and also to carry guests on excursions around Puget Sound. SEAKIST is 76 ft. long, electrically equipped throughout and driven by a 150 hp., Atlas-Imperial Diesel engine. ROBERT A., is 72 ft. over all, electrically equipped and powered with a 150 hp. Western-Enterprise Diesel.

The field of all-steel fishing boats of large size is being invaded for the first time on the Pacific coast in the construction of ORIENT, at the yard of the Los Angeles Shipbuilding and Drydock Corporation, at Long Beach, in Southern California. This interesting craft is for order of Frank Theodora, J. E. Asouca, and the San Diego Packing Company. Designed by G. B. Newby, ORIENT will be 112 ft. 5 in. long, 25 ft. beam, 12 in. moulded depth, and 9 ft. 5 in. draft. She will be driven at 10.5 to 11 knots by a 350 hp., Atlas-Imperial Diesel engine. Large fuel tanks give her a cruising radius of 4,000 to 4,500 miles. As in the case of most of the larger tuna boats, ORIENT'S hull will be completely cork-insulated.

Recent Atlas-Imperial Diesel Installations on the East Coast

h.p.	Cyl.	Bore Stroke	Vessel	Type	Owner	Location
200	4	11½ x 15 "	"TOURIST"	Tug	John Gilbert	Buffalo, N. Y.
140	6	8½ x 12 "	"HELENA"	Subchaser	J. J. Matheson	Gloucester, Mass.
140	6	8½ x 12 "	"ZODIAC"	Schr. Yacht	Johnson & Johnson	Gloucester, Mass.
140	6	8½ x 12 "	"SUMAR"	Schr. Yacht	David E. Whitney	Brooklyn, N. Y.
125	4	10½ x 14 "	"JANET"	Tug	United Dredging Co.	New York, N. Y.
90	4	8½ x 12 "	"COMMANDER"	Ferry	Rockaway Boat Co.	Brooklyn, N. Y.
90	4	8½ x 12 "	"BLUE MOON"	Schr. Yacht	F. G. Shaw	Boston, Mass.
90	4	8½ x 12 "	"R. C. LUNDY"	Party Boat	Anton Lundy	Brooklyn, N. Y.
90	4	8½ x 12 "	" "	Tank Barge	S. O. S. Welding Corp'n.	Brooklyn, N. Y.
90	4	8½ x 12 "	"FALMOUTH"	Schooner	United Fisheries Co.	Gloucester, Mass.
65	3	8½ x 12 "	"COMANCHE"	Party Boat	Jos. Moravec	Brooklyn, N. Y.
65	3	8½ x 12 "	" "	Tow Boat	M. J. Cooney	Gloucester, Mass.
45	3	7 x 10½"	"ELEANOR MAY"	Schooner	O. G. Borgen	Nantucket, Mass.
45	3	7 x 10½"	"ATLAS"	Party Boat	Chas. Nelson	Brooklyn, N. Y.
45	3	7 x 10½"	"U and I"	Schooner	Jay Hunt	Portland, Me.
40	4	6½ x 8½"	"PANSY"	Party Boat	P. B. Black	Bayonne, N. J.
75	6	6½ x 8½"	"ELMAR"	Party Boat	Jos. Ecock	Brooklyn, N. Y.
140	6	8½ x 12 "	"DORIS & RUTH"	Schooner	Nelson Amiro	Gloucester, Mass
200	6	10 x 13 "	"RUTH & MARGARET"	Schooner	Val. O'Neil	Gloucester, Mass.
70	4	7½ x 10½"	"CONVOY"	Towboat	Sam'l Gunyon	Brooklyn, N. Y.

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